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A VIEW

OF

THE SOIL AND CLIMATE

OF THE

UNITED STATES OF AMERICA.

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A VIEW

OF

THE SOIL AND CLIMATE

OF THE

UNITED STATES OF AMERICA:

WITH SUPPLEMENTARY REMARKS

UPON FLORIDA; ON THE FRENCH COLONIES ON THE MISSISSIPPI AND OHIO, AND IN CANADA; AND ON THE ABORIGINAL TRIBES OF AMERICA.

BY C. F. VOLNEY,

MEMBER OF THE CONSERVATIVE SENATE, &c. &c.

TRANSLATED, WITH OCCASIONAL REMARKS,

BY C. B. BROWN.

WITH MAPS AND PLATES.

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PREFACE.

THE following work is the fruit of a residence of three years in the United States, which took place in circumstances widely different from those of my residence, twenty years ago, in Turkey. In the year 1783, I embarked at Marseilles, with all the gaiety of heart, all the cheerful and aspiring hopes natural to youth.

I exchanged, without regret, a land of plenty and peace for a region of anarchy and desolation, actuated merely by a thirst of useful knowledge, and a desire to employ the restless and inquisitive period of youth, in making provision for the consolation and embellishment of age. In the year 1795, I embarked at Havre for America, with all the dreary feelings that flow from the observation and experience of persecution and injustice. Saddened by the past,

anxious for the future, I set out for a land of freedom, to discover whether liberty, which was banished from Europe, had really found a place of refuge in any other part of the world.

In this frame of mind, I visited almost every part of the United States, studying the climate, the laws, the people, and their manners, chiefly in the relations of social and domestic life; and such was the contrast which the scene before me bore to that which I had left, that I resolved to make it my future residence. France, and indeed Europe in general, presented to my view nothing but a gloomy and tempestuous prospect; a series of endless and obstinate wars, between expiring prejudices and new-born knowledge, between antiquated privileges and popular claims. Here I beheld nothing but a splendid prospect of future peace and happiness, flowing from the wide extent of improveable territory; from the facility of procuring property in land; from the necessity and the profits of labour; from the liberty of action and industry; and from the equity of the government, a virtue which it owes to its very weakness. Here, therefore, I resolved to remain, when, in the spring of 1798, there broke out so violent an animosity against

France, and a war seemed so inevitable, that I was obliged to withdraw from the scene.

I might here complain of the violent and public attacks made upon my character, with the connivance, or at the instigation of a certain eminent personage, during the last days of my residence in America; but the election of 1801 has reversed the scene that took place in 1797, and is to me an ample atonement for all that I have suffered. I cannot, however, forbear dwelling on the folly of the suspicions with which I was loaded. I was stigmatized as the emissary of a government, whose axe was continually falling on the necks of those whose conduct and opinions resembled mine. They fancied that I was engaged in a conspiracy (*me*, a single solitary Frenchman) to throw Louisiana into the hands of the directory, which, at that time, had scarcely an existence, in defiance of the testimony of a thousand witnesses, the most respectable in Kentucky, as well as in Pennsylvania and Virginia, who knew my sentiments to be entirely hostile to such a transfer of territory. They knew that I regarded the scheme as visionary and delusive, and dreaded it as tending to embroil us with the United States, and to strengthen their bias to-

wards England. It was well known to be my opinion, that its settlement would be expensive and precarious, its defence difficult, on account of our languishing marine, and the instability of our government; and that it could not fail, sooner or later, of blending itself with the nation contiguous to it, and which alone possesses the adequate means of governing, peopling, and defending it. These notions, so contrary to those of most of our ministers and statesmen, exposed me to their hatred, and almost to their persecution. Nevertheless I continued to maintain them when there was no small danger in doing so; for which I may now take some credit to myself, since these principles have since been sanctioned and adopted by the highest authority.

My readers will doubtless be surprised when they are informed that the ill-will of the first magistrate, at a time when the great Washington gave me many public proofs of his esteem and confidence, arose entirely from the *vanity* of *authorship*, made sore by my objections to his book on the constitutions of America. As a man of reading and a stranger, often questioned on the subject in a land of perfect liberty, I had

occasion to speak my sentiments before the author had been elevated to the highest office in the government. Unluckily I concurred with one of the best English critics, who condemned the book as a crude and inaccurate compilation, and insinuated that it was written with some secret purpose, which the course of future events only could unfold. I ventured to suspect that this purpose was the gaining, by this national flattery, the popular favour and suffrages: when the prophecy was fulfilled, the prophet was not forgotten.

On my return to France, I conceived the design of a work as advantageous to my countrymen, as it would be useful to myself; which was that of comparing my own observations and reflections with those already scattered through various publications, in order to detect and remove some errors adopted in moments of enthusiasm. After laying a suitable foundation in an examination of the climate and soil, I proposed, agreeably to the most natural and instructive method, to consider the numbers of the people, their diffusion over the surface of their territory, their distribution into classes and professions, their manners as influenced by their actual situ-

ation, and by the habits and prejudices derived from their ancestors. By simply tracing their history, laws, and language, I proposed to detect the error of those who represent, as a sort of new-born race, as an *infant nation*, a mere medley of adventurers from all parts of Europe, but more especially from the three British kingdoms. The composition of these worn out and motley elements, into one political body, would have led me to explain briefly the formation of each colony, to pourtray their founders, to analize those early principles, which have run through all their institutions, and which exemplify the common observation, that early habits and impressions modify the whole existence of collective bodies, as well as of individuals. We should thus have discovered the sources of that diversity, which grows daily more conspicuous in the character and conduct of the different parts of the *union*.

In a brief review of the circumstances attending the claim of independence, many new remarks would have been suggested as to its real nature and consequences. Many striking resemblances would have presented themselves between the American and French revolutions, which have

hitherto escaped superficial observers. In the motives and conduct of parties, and the means they used, we discover a manifest resemblance. There will appear the same fluctuation of views and interests, the same ultimate decline of public spirit. Even in the character of the three successive national assemblies, both nations present the same picture; the first of these having outstripped, and the last having fallen short of the knowledge and improvements of a whole generation. We shall one day learn that the great national commotions called *revolutions*, are not so much the creatures of prudence and design, as mechanical effects produced by the impulse and collision of the passions.

In discussing the events, so little known, of the period that elapsed from the revolution to the establishment of the federal government, I should have shown in what manner the national character was influenced by that season of disorder; the changes in public opinion, wrought by an inundation of returning royalists, and of mercantile adventurers from Europe; the depravity of manners and corruption of principles, flowing from the creation of paper-money; the weakness of the laws; and from the transient

wealth and permanent luxury which the wars in Europe poured into a neutral country. I should have explained the influence of European wars on the prosperity of these states; the benefits they have visibly acquired, in spite of their feeble and disjointed government, from the last war; the obvious advancement of their power and ambition towards the West Indian isles and the neighbouring continent; and their probable aggrandizement in future, notwithstanding their internal factions and divisions. I should have explained that disjunction of interests and views, and contrariety of habits, which already separate the eastern from the southern, the Atlantic from the Mississippi states; the preponderance of the mercantile interest in the one, and the agricultural in the other; the weakness of the *south*, from the prevalence of slavery; and the strength of the *east*, the fruit of private freedom and industry. I should have dwelt upon the grand source of their divisions, in their jarring political systems, which have split the nation into federalists and republicans; the former maintaining the superiority of monarchical, or rather of despotic principles of government, over all others; the necessity, in all governments, of an absolute

and irresistible power, created by the headstrong passions and incurable ignorance of the multitude, and sanctioned by the example or experience of all nations; a power raised upon a politico-religious foundation, like that claimed by the Stuarts of England: the latter asserting that absolute power is the primary source of national vice and misery; that those who exercise it are exempt from none of the errors and passions of their fellow-mortals, but, on the contrary, that it manifestly tends to produce, diffuse, and perpetuate these errors and these passions, both in the master and the slave. Unlimited authority always runs into tyranny and frenzy, and is the parent of that popular corruption for which it is the boasted antidote. If men are by nature degenerate and vicious, these evils can only be corrected by reason and justice, and create a stronger necessity for a wise and equitable government, and this is attainable only by ardent and general discussion and enquiry, by the utmost freedom of consultation and opinion among all who partake the same common nature. In short, the doctrines of this party are contained in the declaration of rights, on which the constitution of the United States is built.

I should have enquired into the consequences to be dreaded from these dissentions: whether the dismemberment of this vast body into a few powerful parts would be as dangerous to the general peace and safety as is commonly imagined; whether liberty and energy be not impaired by a combination so very compact and entire; whether a youthful nation may not be corrupted by such profound security, such unvarying prosperity; whether that *youth*, which they are so prone to attribute to their nation, be not more strongly indicated by their lively and ambitious hopes, than by their actual weakness; and whether it does not chiefly appear in that insolence and inexperience with which they greedily devour the goods of fortune, and hearken to the blandishments of flattery.

I should then have considered the conduct of this people and their government, from 1783 to 1798, in a moral view, and should have proved, by the plainest facts, that this conduct has not been suitable to the magnitude of their numbers and territory, to the importance of their situation and their duties; that they have shown less frugality and order in their expences, less integrity in their transactions with strangers, less

public decency, less moderation and forbearance in their factions, less discipline in their seminaries of education, than most of the old nations of Europe. That what they are able to show of meritorious and useful, what portion they have of public or private security and liberty, they principally owe to popular and individual habits, to a casual equality of conditions, to the necessity of diligence, and the high price given for labour. That the character and principles of their leaders have deplorably degenerated; that, in 1798, very little more was wanting to one of the parties, but a suitable occasion and favourable means, in order to subvert the whole structure built up by their revolution. That they are indebted, for their public and private prosperity, more to their remote and disconnected situation, to their distance from powerful neighbours and the theatre of war, to a lucky and fortuitous concurrence of events, than to the wholesome vigour of their laws, or the wisdom and discretion of their governors.

These will doubtless be thought very daring assertions, after all the eulogies lavished on this people by their own writers, and by those of Europe, and after the motion made in congress,

to decree that *their nation is the wisest and most enlightened upon earth*;* but as censure does not always flow from envy or malice, as undeserved blame is less hurtful than unmerited praise, and since I cannot now be suspected of resentful or sinister motives, I might have ventured to utter truths, which, though harsh, would not have been denied by impartial readers; particularly as, in thus performing the office of a monitor, I should have given my warmest applause to that by which the United States is most gloriously distinguished, *the liberty of opinions and of the press.*

In viewing this country, as a refuge for Frenchmen, I should have delivered the dictates of my own experience and that of many of my countrymen, as to the resources and amusements which our merchants and our wealthy idlers would meet with in the cities, and what enjoyments the country would afford them. It might appear absurd, but I should not hesitate, to dissuade my countrymen from following my own example. The truth is, that, in this country, as many facilities and benefits attend the settlement of the

* Where is the record of this motion to be found?—TRANS.

English, Scots, Germans, and even Hollanders, from the resemblance that prevails between their manners and habits and those of America, as there are disadvantages and obstacles, flowing from a contrariety in these respects, attending natives of France. I have observed, with much regret, none of that friendly and brotherly goodwill, in this people, towards us, with which some writers have flattered us. On the contrary, they appear to me to be strongly tinctured with the old English prejudice and animosity against us; a spirit exasperated by the ancient wars of Canada; imperfectly suspended by their alliance with us, during their *rebellion;* and revived, of late years, with uncommon force, by the declamations of their orators, by the addresses of their towns and corporations to president Adams, on occasion of the pillage suffered by their commerce from our privateers, and even by public exercises and oratorical invectives in their colleges. There is nothing in the social forms and habits of the two nations that can make them coalesce. They tax us with levity, loquacity, and folly; while we reproach them with coldness, reserve, and haughty taciturnity; with despising those engaging and sedulous civilities, which we so

highly value, and the want of which are construed by us into proofs of impoliteness in the individual, or of barbarism in the whole society. Yet the latter charges must have some foundation, since they are often made by German and English travellers, as well as by ourselves. I, who had been already, by my residence among the Turks, in a great measure delivered from slavery to forms, was more disposed to scrutinize the cause, than to repine at the effect, and to me this national incivility appears to flow, less from a proud or unsocial temper, than from the mutual independence of each other, and the general equality, as to fortune and condition, in which individuals in America are, for the most part, placed.

Such was my plan: some branches of which I have been able to accomplish, but my recent engagements, both of a public and private nature, will not permit me to complete the whole. I have therefore resolved to publish at present only that part of my work which may be detached, without injury or mutilation, from the entire performance.

In sending this work abroad, I am far from indulging those sanguine hopes, which many

readers may ascribe to me. The splendid success of my *Travels in Egypt*, so far from inspiring me with confidence, in the issue of similar undertakings, contributes rather to a contrary effect; my present theme being much less diversified and entertaining; more grave, abstruse, and scientific; and there always being an abundance of readers who feel and act like the Athenian, whose voice was for punishment, merely because he was tired of hearing Aristides called *the just*.

I have sometimes even thought it most prudent to write no more; but I likewise reflected, that to have once done well, affords no excuse for doing nothing the rest of our lives; that I owe all the consolations I possessed in adversity to books and study, and all the benefits of my present situation to literature and the good opinion of the liberal and ingenious. I offer them, therefore, this last tribute of my gratitude, this final testimony of my zeal for the advancement of knowledge.

I have prepared myself, in what I have written and published, to meet a great deal of obloquy from the Americans themselves, whom their own cause will inspire with zeal, and who make it

their favourite business to combat European writers. They act as if they were the advocates and avengers of their predecessors, the Indians. Their zeal likewise is inflamed, by all those anti-gallican prejudices, which are industrious in decrying every thing that comes from a nation of atheists and jacobins: but time, which changes every thing, will do justice to detraction as well as flattery; and since I never pretended to be infallible, I shall content myself with having directed some attention, and cast some new light, upon many subjects that have been hitherto wholly overlooked.

TRANSLATOR'S PREFACE.

THE author of the following work first acquired distinction, in the reading world, by publishing Travels in Syria and Egypt. In many respects this work far exceeded, in accuracy and comprehensiveness, every former work on the same subject. It was, however, secretly pervaded by a bias against the natives of these countries, by a disposition to view them in the worst light, and by a general persuasion that these countries ought to be possessed by France. With this view he was led to dwell more upon the misery of the people, whom a revolution might benefit, and more particularly on the folly and depravity of their government, which would render them an easy prey to invasion, than former travellers, who had none of these prepossessions, had done. With all the science and method, therefore, which that work displays, are combined a great deal of error and mis-

take, and they that wish to be acquainted with these celebrated provinces, ought indeed by no means to overlook, but still less ought they wholly to confine their attention to Volney's account of them.

After a lapse of ten or fifteen years, Volney conceived the design of visiting another hemisphere. The rising states of America offered him not only an object worthy of his curiosity, but a place of secure asylum in a time of danger and distress. America was, to him, pretty much in the same situation as Syria and Egypt had been. Former French travellers had brought back the most flattering pictures of the people, their climate, and their government, and the *splendid* success (as he himself styles it) of his former work inspired him with new zeal to apply the test of his wonderful sagacity to their fond delusions, and reduce their exaggerated dreams and glowing fancies to the standard of truth and good sense.

Fortunately for Volney, circumstances have prevented him from publishing his observations on the government and manners of the people. These are topics, on which his prejudices as a Frenchman, and as a vain and captious mortal, would have abundant opportunity to show themselves, and in which he would have been in perpetual danger of shocking the prejudices of the people he described. He has merely

confined himself to a review of the physical condition, as to surface and climate, of the United States, and to some remarks on the character and situation of the aboriginal tribes.

Considered as a picture of the physical condition of the country, as far as respects its surface and climate, it would by no means be its due praise to say that it is the best and most complete that has hitherto appeared, because there has hitherto been no general description of the country in these points of view: particular provinces have been described with a philosophical accuracy, which is highly honourable to the genius of our country, but the whole, and especially that portion of it which lies upon the Mississippi and the lakes, had not been before subjected to the same analysis.

There is, perhaps, no part of this work which will be thought to be more inaccurately and superficially executed, than that which relates to yellow fever and the other diseases of America. By stepping into a circle foreign to his own, and in which his education and experience, notwithstanding his own opinion to the contrary, by no means qualified him to walk, he has exposed himself to much critical censure from professional men. On this subject, indeed, he would, for obvious reasons, have found it impossible to

please all: but, as it is, it is much to be suspected that he has failed to please any.

The merit of a work ought to be estimated, not only by comparison with what has been already done, but by considering the means and situation of the author; and surely uncommon praise is due to Volney, for having produced a work so accurate and scientifical, almost wholly from the funds of his own observation, with so little assistance from former publications, in relation to a country of such vast extent, and so much in the state of wilderness, and during so short a residence. Instead of reproaching him for the mistakes committed, we should grant him liberal applause for the truths he has attained.

But, while we pardon his errors, and deem them amply atoned for by his merits, it is a duty which we owe to the enlightened world, to our country, and even to the writer himself, to point out his mistakes. The present translator has not only done this, as far as his limited knowledge would permit, but he has obtained, from one or two learned and ingenious friends, some additional remarks upon the text. On this head he is particularly indebted to Dr. B. S. Barton, who has made the natural history of this part of America, and the manners and dialects of the aborigines, the objects of great and successful study.

This gentleman's remarks are given in the form of additional notes.

He has taken the liberty of somewhat extending the quotations of his author from the work of Bernard Romans upon Florida, because this writer may be deemed almost unknown to the present age, because his remarks are extremely judicious, and because the country he speaks of is rapidly growing into an object of extraordinary interest and curiosity to the people of the United States.

As to the manner in which this translation has been conducted, the writer has endeavoured to give the meaning of his author, in the clearest, most faithful, and most distinct manner. For this purpose he has not thought it necessary to transfer the remarkable verbosities of his original into his own performance. In two instances only he has more materially deviated from the text of his original. In detailing the history of Swedish and Norwegian winds, he has omitted the parade and incumbrance of a private letter, with which M. Volney thought proper to connect his observations on that subject, and in all thermometrical statements, he has turned the calculations of Reaumur into the corresponding ones of Fahrenheit, the latter being the only current and intelligible system in Great Britain and America.

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ERRATUM.

Page 236, line 4, for *gas* read *acid*.

A VIEW

OF THE

SOIL AND CLIMATE

OF THE

UNITED STATES OF AMERICA.

CHAPTER I.

Extent and Geographical Divisions of the United States.

WE may, in loose terms, describe the United States as the region which occupies that part of North America, which is bounded on the east by the Atlantic Ocean, on the south by the Caribbean Sea and Mexican Gulph, on the west by *the great river* of Louisiana, and on the north by the river of Canada, and the five great lakes which supply its stream. At a time, when the advantages of natural barriers and definite boundaries are so justly prized, we cannot doubt that the above outline, so strong and distinct,

will, sooner or later, be filled up*. At present, however, this outline is encroached upon, southward, by the peninsula of East, and the maritime district of West Florida, and on the north-east by the English provinces of Lower Canada, Nova Scotia, and New Brunswick, which take off a large portion of the country contained between the river and the sea.

Its extent, from north to south, is equal to sixteen degrees, it lying between the 31st and 47th degrees of north latitude. It stretches, east and west, upwards of twenty-five degrees of longitude. The immense square which these dimensions exhibit is considerably curtailed, by the direction of the sea coast, which moves diagonally from north-east to south-west, and by the five lakes, which dip seven or eight degrees within these limits to the north. The real surface is thus diminished by more than a third.

Hutchins is the first geographer who, after the peace of 1783, attempted to calculate the area of this territory. He makes it amount to about a million of English square miles. Agreeably to this statement, its extent is nearly fourfold that of France, before the

* The recent addition of Louisiana has carried the western limit far beyond the Mississippi, and embroiled it in a world of unexplored deserts and thickets. This circumstance has aided the imagination in its excursions into futurity; and instead of anticipating the extension of this empire merely to the sea on the south, and to the *great river* on the north, we may be sure that, in no long time, it will stretch east and west from sea to sea, and from the north pole to the Isthmus of Panama.—TRANS.

revolution, or that of the great peninsula comprising Spain and Portugal, and nearly seven times greater than that of Great Britain and Ireland.

The Americans delight in comparisons of this nature; and their vanity, suggesting golden dreams of the future, is very apt to measure the importance of foreign nations by this scale: but if we recollect that this space contains scarcely *five millions* of inhabitants, of which number *eight hundred thousand*, or one sixth, are black slaves, and that even this number is, for the most part, very widely and thinly scattered, we shall discover, in this extent of territory, nothing but a prolific source of present weakness and future disunion. Besides, Hutchins, who was unacquainted with the sources of the Mississippi, and knew little of the regions north of the Ohio, appears to have computed too largely, and his estimate, though sufficiently correct for my purpose, does not deserve that implicit credit with which it has since been generally received*.

If we compare the United States with the countries of the eastern hemisphere, under parallel latitudes, we shall find that the southern districts of the former, Georgia and the Carolinas, correspond with the kingdom of Morocco, and the whole northern coast of Africa: and it is somewhat remarkable, that the Mis-

* I have seen, in Mr. Jefferson's hands, a letter from Hutchins, dated February 11th, 1784, which acknowledges considerable errors in his calculations respecting the North-west territory.

sissippi and the Nile enter the sea under nearly the same parallel of latitude, one at 29 and the other at 31 degrees; the one flowing from the north, and the other from the south, and bearing a striking resemblance to each other, in the riches and abundance produced by their periodical inundations. The same lines traverse Syria, the central provinces of Persia, Thibet, and the heart of China; and nearly the same parallel strikes Savannah, Tripoli, Alexandria, Gaza, Bosra, Ispahan, Lahor, and Nankin. The northern states, Massachusetts and New Hampshire, correspond with southern France, middle Italy, European Turkey, the Euxine and Caspian Seas, and the plains of Tartary. The same line very nearly touches Boston, Barcelona, Ajaccio, Rome, Constantinople, and Derbend. Such extensive limits indicate a great variety of climate, and, in truth, the United States displays all the extremes of the countries just enumerated. We observe a gradation corresponding with the latitude, and proportioned particularly to the elevation of the surface. In this view, the four following distinguishing characters may be clearly traced:

In the first place, the coldest climate extends over the eastern states, or New England. Its limits will be found in the southern coasts of Rhode Island and Connecticut, and in an inland chain of mountains, which divides the waters of the Delaware and Susquehannah from the streams flowing eastward.

The second division may be termed the temperate climate. It comprehends those called the middle

states, and extends through Pennsylvania and Maryland to the banks of the Potowmack, or, more accurately, to those of the Patapsco.

The third, or the hot climate, will comprise the southern states, or the plains of Virginia, the two Carolinas, and Georgia, as far as Florida.

The fourth is the climate of the *western country*, of Tenessee, Kentucky, the Mississippi and North-western territories*. These are situated behind the great chain of the Allegheny, and westward of the states before-mentioned, and are hotter, as I shall hereafter show, by three degrees of latitude, than the countries eastward of that mountain.

* The North-western territory has been lately erected into the state of Ohio.—TRANS.

CHAPTER II.

Face of the Country.

TO a traveller from Europe, and especially to one accustomed, as I had been, to the naked plains of Egypt, Asia, and the coasts of the Mediterranean, the most striking feature of America is the rugged and dreary prospect of an almost universal forest. This forest is first discerned on the coast, but continues thickening and enlarging from thence to the heart of the country. During a long journey, which I made in 1796, from the mouth of Delaware, through Pennsylvania, Maryland, Virginia, and Kentucky, to the Wabash, and thence northward, across the North-west territory, to Detroit, through Lake Erie to Niagara and Albany; and, in the following year, from Boston to Richmond, in Virginia, I scarcely passed, for three miles together, through a track of unwooded or *cleared* land.

I always found the roads, or rather the paths, bordered and obscured by copse or forest, whose silence, uniformity, and stillness was wearisome. The ground beneath it was sterile and rough, or encumber-

ed with the fallen and decaying trunks of ancient trees. Clouds of gnats, mosquitoes, and flies hovered beneath the shade, and continually infested my peace. Such is the real state of these Elysian fields, of which, in the bosom of European cities, romancers entertain us with their charming dreams. On the sea coast there are, however, many open spaces, which the progress of cultivation and the vast consumption of fuel in the cities have occasioned. There are likewise considerable openings in the western regions especially between the Wabash and the Mississippi, on the banks of Lake Erie, and those of St. Laurence, in Tenessee and Kentucky, where the nature of the soil, or, more frequently, the annual or ancient conflagrations of the Indians, have opened vast deserts, called savannahs by the Spaniards, and prairies by the Canadians. These bear no resemblance to the arid plains of Arabia and Syria, but remind us rather of the *steps* or grassy wastes of Tartary and Russia. The prairies may be described as *steps*, covered with ligneous plants, growing very thick, and to the height of three or four feet. They display, in spring and autumn, a lively carpet of verdure and flowers, and such a scene is very rarely to be met with in the dry or stony plains of Arabia. In the rest of the country, especially among the inland mountains, trees are found in such numbers, and their prevalence is so little checked and circumscribed, that the United States, compared with such a country as France, may justly be denominated one vast forest.

If we subject this immense wilderness to a single comprehensive view, we shall be led to divide it into three regions or districts, each of which is distinguished from the rest by the nature of the timber it produces. The kind of tree, as the American observes, indicates the nature of the soil it grows upon.

The first of these districts I shall call the *southern forest*. It embraces the maritime parts of Virginia, the two Carolinas, Georgia, and Florida, and may be generally described as extending from the bay of Chesapeake to the river St. Mary, over a gravelly and sandy soil, spreading from a hundred to a hundred and fifty miles wide. All this space is thickly planted with the pine, fir, larch, cedar, cypress, and other resinous trees. It presents a scene of perpetual verdure, which, however, is only a cover for sterility, except in those spots which the course of rivers and alluvial depositions have fertilized, and which cultivation has made abundantly productive.

The *middle forest* comprehends the hilly parts of Carolina and Virginia, all Pennsylvania, the southern part of New York, all Kentucky, and the country north of the Ohio, as far as the Wabash. This whole extent is covered with the oak, ash, maple, hiccory, sycamore, acacia, mulberry, plum, birch, sassafras, and poplar. In the western part are found the cherry, horse chesnut, the sumac, &c. and all the kinds that indicate a rich soil, the only basis of the prosperity of this portion of the states. The resinous trees are mingled, in the plains and vallies, with those

just mentioned, and form entire woods upon the mountains. They are met with in the chain called, in Virginia, the *south-west*, but, contrary to usual appearances, they here cover a red, deep, and fat soil.

The third district, or the *northern forest*, is likewise composed of the fir, pine, larch, cedar, and cypress. It spreads itself over the western parts of New York, and the inland countries of New England; exclusive, however, of the *inter-vales* and banks of rivers. It advances northward into Canada, and is lost at last among the deserts of the polar circle, where the trees dwindle down into thinly scattered junipers and other hardy plants, of stinted growth and scanty product.

Such is the general aspect of the territory of these states. The picture is composed of an almost universal forest, varied and broken by five vast lakes, or inland seas, in the north; by immense natural meadows, or *prairies*, in the west; and in the centre by a chain of mountains, whose ridges are parallel to the sea coast, at the distance of from fifty to a hundred and fifty miles, and which turn, to the east and west, rivers of a longer course, wider channel, and more ample stream, than we are accustomed to meet with in Europe*. These rivers are broken into cataracts, from twenty to

* M. Volney probably limits this comparison, in his own mind, to France or Britain, for the German, Polish, and Russian rivers fall not short of ours, in any of these circumstances. The American reader may listen with less dissatisfaction to our author's idea of an universal forest, when he is reminded that our present

one hundred and forty feet in height, and enter the sea in mouths that expand into gulphs. In the southern regions, the bogs or swamps extend above three hundred miles. In the north, the snows lie on the ground four or five months in the year. On one side, in a course of nine hundred miles, are scattered ten or twelve towns, built entirely of brick, or of painted wood, and containing from ten to sixty thousand souls. Without the cities are scattered farm-houses, built of unhewn logs, surrounded with a few small fields of wheat, tobacco, or maize, that are still encumbered with the half burnt stocks of trees, and are divided by branches laid across each other, by way of fence*. These rude dwellings and fields are

population consumes and exports the product of less than *one fiftieth* of the whole surface, and *fifty* acres of woodland would hardly be lessened to the eye, by cutting down *one* acre only. This diminution would be still less apparent, if the acre of wood thus removed were not one entire acre, but made up of trees scattered irregularly through the whole mass; but this has been pretty much the case in the settlement of North America. By an eye that could view the whole territory at a single glance, nothing would be seen but a *boundless contiguity of shade*. Very different, however, would be the face of things partially seen—TRANS.

* Those who are not enabled, by their own observation and experience, to qualify this general representation, will be led by it into great errors. In traversing New England, Jersey, and the eastern parts of Pennsylvania and Virginia, the scene is widely different from that above described. The picture is fully realized in those quarters only which are newly settled, and where attempts have just been commenced for reclaiming the wilderness. —TRANS.

embosomed in the depth of the forest, and diminish in number and extent, as you advance inland, till they appear, from neighbouring heights, like little squares of brown or yellow, on an immeasurable ground of deep green. The atmosphere is, by turns, very dry or very moist, very hot or very cold, very turbulent or very still; so capricious, that the same day will freeze with the colds of Norway, scorch with the ardours of Africa, and present to you, in swift succession, all the four seasons of the year. This is a concise but faithful picture of the United States.

THE GENERAL FORM.

To afford an accurate knowledge of the structure of this vast country, it will be necessary to describe more particularly the great chain of mountains which forms its principal feature. This chain begins in Lower Canada, on the southern shore of St. Laurence, near its mouth, where its points are called by sailors the hills *de Notre Dame*, and *de la Magdeleine*. Tending south-west, it recedes by degrees from this river, and dividing the streams which flow north-west into that river from those which run south-east, through Nova Scotia, New Brunswick, and Maine, into the sea, it forms the frontier of the United States till it enters New Hampshire. It then stretches southward through Vermont, and assumes the appellation of the Green Mountain, dividing the streams

which feed Connecticut river from those which fall into Lakes George and Champlain; and, after shooting out a great number of branches, which surround the sources of the Hudson, it crosses that river at West Point, forming, with its abrupt points, what are called the Highlands. Here the chain may be said to suffer a double interruption, either because the waters have broken it, or because its substance, which had hitherto been granite, becomes grit stone. The head of this elongation ascends the western bank of the river to the Katskill, and constitutes those summits which form the sources of the Delaware. Hence proceeds a number of ridges, which, after blending with the chain before-mentioned, traverse, in a south-western direction, New York, Pennsylvania, Maryland, and Virginia, continually receding from the sea as they proceed southward. It is very remarkable, that these ridges strike the course of the Atlantic rivers at right angles, the streams rushing through them at gaps or breaks, which have been evidently made by the force of their waters. These ridges, hitherto parallel to each other, re-unite, on the frontier of Virginia and North Carolina, into a grand chain called the *Bow of the Allegheny*, because this chain, taking here a bend to the east, intercepts and absorbs all the collateral and secondary ridges. Somewhat farther south, all the western ridges coalesce with this principal one, and form the series of summits from which the Great Kenhawah and the Holdston on the west, and the Pedee, Santee, and all the Carolinian rivers

on the east, take their rise. From this knot is detached, towards the west, a branch, which, by its first bifurcation north-west, supplies the numerous branches of Kentucky, and by a second, due west, it ranges, under the name of the Cumberland Mountain, through Tenessee, where it interposes between the Cumberland and Tenessee rivers, as far as their intersection with the Ohio: while the grand chain of the Allegheny, almost solitary, continues its course south-west, and forms the boundary of Georgia and the two Carolinas, where it passes under the various names of White Oak, Great Iron, Bald Mountain, and Blue Mountain. Touching the angle of Georgia, it changes its name and its direction, and, under the denominations of Apalachi and Cherokee, it tends due west to the Mississippi, pouring from its northern side the streams belonging to the Tenessee, and from the opposite steeps those that traverse Florida to the Gulph of Mexico.

The length of this chain occasioned the northern Indians to bestow on it the name of the Endless Mountain. The French and Spaniards, who first approached it on the side of Florida, called it the Apalachi, which was the name of a savage tribe, and is also given to a large river in this quarter. The English and American geographers, who became first acquainted with it on the north, have invariably called it the Allegheny. This is an Indian term, which, according to Evans, signifies *endless;* and though less sonorous and agreeable than Apalachi, has obtained

universal currency. For the sake of perspicuity, however, I have called, by the latter name, that branch which strikes the north-west angle of Georgia, and which, less steep and lofty than the rest, spreads itself in innumerable hills over all the country bounded by the Mississippi. It terminates, on this river, in abrupt points, or *cliffs*, and extend from Natchez to the mouth of the Ohio. They never intersect the Mississippi, whose opposite shore is a marsh, whose medial breadth is about sixty miles, and which occupies the right bank for a distance of four hundred and twenty miles, from the mouth of the Ohio to the sea. Here the great continental forest ends, and the *steps* or savannahs begin, which stretch westward to the foot of the hills north of Mexico, and of the stony mountains, the last of which I call, in this work, the Chippaway chain, from an Indian tribe which occupies these regions.

From this survey, it appears that this territory is distributed, by nature, into three grand divisions, parallel to each other, and corresponding, in their longest extent, with the direction of the sea coast, which ranges from north-east to south-west.

The first of these is the eastern country, placed between the sea and the mountains.

The second is the western country, situated between the mountains and the Mississippi.

The third district is the mountainous region itself, which is spread out between the two former ones. As each of these have striking peculiarities of soil and

climate, it will be proper to bestow separate attention upon each.

THE ATLANTIC COUNTRY.

The Atlantic country, so named from the ocean which washes its eastern boundary, and to which all its rivers are conducted, extends from Canada to Florida, over a breadth which varies from sixty to two hundred miles. It is the original seat of the nation, and the residence of the largest portion of its population. Its political divisions are arranged in the following order, beginning at the southern extremity:

Georgia, South Carolina, North Carolina, Virginia, Maryland, Delaware, Pennsylvania, New Jersey, New York, Connecticut, Rhode Island, Massachusetts, New Hampshire, Vermont, and Maine.

Through all this extent, the surface is elevated slightly above the sea; more uniform and flat in the countries south of Maryland, and even as far north as New Jersey, but various, unequal, and occasionally hilly, in the northern parts, particularly Connecticut, Rhode Island, and Massachusetts. Long Island may be considered as the line of division between these two kinds of surface, for the coast northward of this isle, as far as the river St. Croix, and even to the mouth of the St. Laurence, is high, rocky, and covered with plants, which partake of the nature of those of the interior country; whereas, proceeding

southward from this island, we meet with nothing but a flat of pure sand, almost level with the ocean. This sand has evidently been left by the sea, and is traced to a considerable distance inland. It forms the basis of a forest of pines and firs, and other resinous trees. As we approach the mountains, we meet with a mixture of clay and gravel, which the waters have washed from the neighbouring heights, and thus is formed a yellowish, poor, light soil, which prevails throughout the middle *selvage* of the southern states. These lineaments are so clearly traced, that we cannot hesitate in considering Maryland, Pennsylvania, and New Jersey as gradually formed by the depositions of the Potowmack, Susquehannah, Delaware, and Hudson. Farther north, especially in Rhode Island, Connecticut, and Massachusetts, we meet with a continual succession of hills and dales, and the country is broken up into steeps and hollows. This region appears, indeed, to be a continuation of the before-mentioned mountainous border, if the confusion of its ridges, and their granitic structure, did not clearly distinguish them from the Allegheny, whose basis is composed of grit stone, and which moves in a more westerly direction, and at a greater distance from the sea.

THE WESTERN COUNTRY, OR VALLEY OF THE MISSISSIPPI.

The second region, situate westward of the Allegheny, may be termed the valley of the Mississippi, because all the streams which traverse it are ultimately lost in that river, and, of consequence, must flow upon a plane, every where, and upon the whole, inclining towards its channel. This valley, or rather slope of a valley, is bounded eastward by the Allegheny, northward by the Lakes Michigan, Erie, and Ontario, and southward by the Floridas. The lands of western Georgia, however, pouring their streams into the Gulph of Mexico, form a distinct district; but the comparatively small extent of this district, and the uniformity of climate, soil, natural productions, and probable destiny, will justify us in classing with the Mississippi valley all the country west of the Apalachi. This river may be named as the interior limit of the maritime region, towards the south-west.

The valley of the Mississippi comprehends western Georgia, Tenessee, Kentucky, the Mississippi and North-Ohio territories, and some western districts of Virginia, Pennsylvania, and New York. The people of the maritime provinces are accustomed to distinguish this space by the names of the *back country*, the *back woods*, the *wilderness*, and, more fancifully, the *western waters*. The phrase back country is used by them relatively to their own situation with regard

to Europe, the great object and centre of all their thoughts, interests, and speculations. I had scarcely passed the Allegheny, when I heard this phrase applied, by the dwellers on the Great Kenhawah and Ohio, to the maritime country. This is a striking proof that these people have already derived, from their geographical situation, new and peculiar views and interests; that all their thoughts tend, like the great thoroughfares, their rivers, to the Gulph of Mexico, and thence to the West Indies, which is the great point of mercantile attraction in America*.

This valley, on a closer examination, will be found to distribute itself, according to the nature of the soil, and the course of mountains and rivers, into three grand districts. The first of these is situated south of the Apalachi Hills, that forms the Tenessee valley: from this ridge spring the rivers that flow through it to the Gulph of Mexico and the lower Mississippi. This region is distinguished by a flat, sandy, and sterile coast; by marshes which advance far into the country, and which are particularly rich and fertile on the banks of rivers, where maize and rice flourish greatly. A stone, of two or three pounds weight, is here scarcely to be found, for thirty or forty miles from the coast. As you recede from the coast, the surface

* M. Volney draws large inferences from a trivial circumstance. The disjunction and opposite direction of the interests of the two great divisions of the empire, together with its causes, are obvious enough, but have little connection with the terms above-mentioned, which are purely geographical.—TRANS.

begins to ascend, and to become uneven and irregular; the soil becomes stony, and its fertility greatly declines, as is evident from the nature of the forest trees. It abounds with the *ilex*, pine, fir, black and white oak, magnolia, red and white cedar, cypress, and innumerable shrubs, natives of the warm climates. Bartram, an American traveller and botanist, draws a very glowing picture of this country, of which he has made a terrestrial paradise: but, without regarding his exaggerated and poetical descriptions, it will be sufficient to compare it generally with Portugal and the coast of Barbary, in which comparison it has certainly much the advantage.

The second district is bounded, south, by the Tenessee river, north by the Ohio, east by the Alleghenny, and westward by the Mississippi. It comprises the states of Kentucky and Tenessee, which were formed in 1796. This country is covered with woods, and rugged with innumerable hills. The Cumberland ridge, about thirty miles in breadth, runs through it from east to west, dividing the river of that name from the Tenessee. In its vallies and plains, the soil is of an excellent quality, being a rich, black, vegetable earth, from three to five feet in depth, and of inexhaustible fertility. Its trees are far more lofty and gigantic than those in the maritime district. The red, black, and white oak, hiccories of several species, the tulip-bearing poplar, the vine, climbing to a height of twenty or thirty feet, the ash, sugar maple, accacia, sycamore *(western plane)*, horse ches-

nut, gum, pine, cedar, sumac, plum, parsimon, and cherry trees, some of which are five feet in diameter.

The light and friable soil occasions an appearance in the brooks and rivers, which I had previously met with in Syria, and even in France, but never to so great an extent. We continually observe, throughout Kentucky and Tenessee, pits or funnels, from fifty to five hundred paces wide, and from fifteen to fifty in depth, having at the bottom one or more holes or chasms, in which are swallowed up not only the rainy torrents from the neighbouring heights, but even considerable brooks and rivers. They suddenly disappear among the bushes, from the eyes of the marvelling traveller, and pursue their course unseen, through subterranean channels. The rivers, in their visible course, generally groove and hollow out their channels, till they find a bottom of calcareous rock, which forms a kind of horizontal flooring. Hence it is that most of the streams of Kentucky and Tenessee flow in a kind of trench, formed by two sharp and steep banks, of the height of fifty feet, like those of the Ohio, or four hundred feet like those of the Kentucky river at Dixon's point: hence, likewise, it happens, that the country abounds with dark and deep hollows and glens, where it is not traversed by lateral branches of the Allegheny, distinguished by their rapid slopes, and the narrowness of their summits*:

* It is on these summits, however narrow, that the Indians, and after them the Americans, have traced their paths or roads.

and hence, likewise, it happens, that the soil can never be improved by irrigation. The people already begin to complain of an aridity, which keeps pace with the clearing of the country, and completely dissipates the fond allusions of travellers and land speculators.

It is commonly believed, in Kentucky, that the springs have become more abundant, since the woods around them have been removed. I have examined the truth of this representation on the spot, and endeavoured to ascertain the true cause of this appearance. It seems to me to be owing to the ancient accumulation of leaves upon the surface of the earth, raising gradually a deep and compact bed, such as we now meet under the shade of forests which still subsist, by which the rain and dews have been retained long enough to evaporate, without sinking into the earth. Since this bed has been destroyed, and the ground opened by culture, the water easily sinks below the surface, and forms more durable and more abundant reservoirs. It is nevertheless true, that the moisture of the atmosphere, and the copiousness of springs in general, are diminished, especially upon the higher grounds, by the destruction of the woods, by which the condensation of the vapours is lessened or pre-

One of the most striking specimens of this kind of road is to be found on the Gauley ridge, among the Kenhawah Mountains. This ridge is not fifteen feet broad in the course of a mile, while there is a perpendicular descent on either side of six or seven hundred feet.

vented. Kentucky itself, as well as the other states, continually affords proof of this, in a multitude of brooks, which have not been drained within five years, but which are in want of water every summer. Many of them have wholly disappeared, and several mills, in New Jersey, have been abandoned on this account*.

Another remarkable appearance in America requires explanation. We never enter the forest without meeting with fallen trees, the roots of which exhibit a mass of fibres, in shape somewhat resembling a mushroom. These fibres appear not to have pierced to a greater depth than eighteen inches, in trees seventy feet in length. That these roots descend no deeper, has probably happened that they might profit by the moisture at the surface, and the rich mould formed by decayed leaves, a substance more congenial to their growth than the sub-stratum, which remains dry, and is consequently less penetrable. And now that this mode of vegetation has been nurtured and gradually fixed by the lapse of ages, as long a series of ages will be requisite to change or new modify it.

The third district is bounded southward by the Ohio, by the great lakes on the north, and on the east and west by the Allegheny Mountain and the Missis-

* We may also add, that formerly the waters were stagnated by the trunks of fallen trees, and by weeds: the removal of these has, of course, afforded a passage to the stream.

sippi respectively. This region, called the North-western territory, in consequence of its slender population has not yet been erected into a state*. The surface is either plain, or composed of gentle inequalities and undulations. It would be difficult to meet with a hill five hundred feet high; and the western parts of it, between the Wabash and the Mississippi, are little else than immense flats or natural meadows. Regular as this surface is, it still inclines in such a manner as to give opposite directions to the course of great and numerous rivers; some of which flow, by the Mississippi, into the Gulph of Mexico, others into the north Atlantic, by the St. Laurence, and others, lower down, into the same great reservoir, by the Mohawk, Hudson, and Susquehannah. Hence it appears, that the Allegheny, from which the latter streams originate, forms a kind of rampart to this vast undulating surface, which is nearly on a level with its summit. The surface, in general, is so slightly inclined, that the rivers descend slowly and circuitously, and frequently stagnate into swamps, and when swelled by winter rains, the sources are connected so as to be navigable in canoes. Such is the case between the Wabash, which enters the Ohio, the Miami, which falls into Lake Erie, the Huron, which mingles with the lake of the same name, and the *Great river*, which enters Lake Michigan, and many others.

* At the time of our author's writing.—TRANS.

These rivers, different in this respect from those of Kentucky, flow over an earthen bed; and this arises not only from the general equality of surface, and consequent tardiness of the current, but from the argillaceous or clayey nature of the soil, which their waters cannot disjoint or penetrate. This circumstance will hereafter be favourable to commerce and agriculture, and popular opinion has already manifested a preference for this district over Kentucky. It will, doubtless, prove hereafter the Flanders of America, and bear away the prize equally for pasture and tillage. In 1796, I saw, on the banks of the *Great Scioto*, a field that had just been cleared, which produced maize fourteen feet in height, and of proportionable thickness. At this period, if we except a few scattered dwellings, all beyond the Muskingum was a wild wilderness of trees, swamps, and fevers. I traversed one hundred and twenty miles of this forest, from Louisville, near the rapids of Ohio, to Vincennes, on the Wabash, without lighting on a hut, and, what surprised me still more, without hearing the voice of a bird, though in the month of July. This forest ends just before you reach the Wabash, and from thence to the Mississippi, a distance of eighty miles, all is prairie or meadow. Here commences the *American Tartary*, bearing, in all respects, a strong resemblance to the Asiatic. Though warm and sultry in the southern quarter, the air becomes chill, and the soil unkindly, as you go northward. Be-

yond the 48th degree of north latitude, the waters are frozen six months in the year, the ground is overshadowed by deep woods, or drowned in swamps, and intersected by rivers, which, in a course of three thousand miles, have not fifty miles of interruption or *portages*. In all these features, we recognize a likeness to the ancient Tartary, which would be entire and complete, could we see its natives metamorphosed into horsemen. This transformation has, within the last twenty-five or thirty years, taken place, in some degree, among the Nehesawey or Noudowessey Indians, who are mounted upon Spanish horses, stolen in the plains north of Mexico. In half a century, these New Tartars will probably become formidable neighbours to the people of the United States, and the settlers beyond the Mississippi will encounter difficulties totally unknown to their ancestors.

THE MOUNTAINOUS DISTRICT.

The third grand division is formed by the mountains, which stretch from the mouth of the St. Laurence to the frontier of Georgia, disparting the eastern and western waters, and forming a lofty terrace or rampart between the Atlantic and the Mississippi, the maritime and the fluvial districts. The length of this belt or band may be computed at twelve hundred miles, and its breadth, which varies much, at from ninety to one hundred and fifty miles.

This region, though comparatively narrow, modifies, in a considerable degree, the temperature of the adjacent districts, from both of which it widely differs, in climate, soil, and products. Towards the south, the air is purer and dryer, more elastic and salubrious; towards the north, and beginning near the Potowmack, cold and moisture begin to prevail, the animals are larger and more active, and the forest abounds with trees, not so large as those of the western woods, but superior to those of the east, and surpassing both in elasticity.

This chain of mountains differs from those of Europe in the greater length and regularity of their ridges, but are much inferior in elevation to the Alps and Pyrenees. The measurements, which I was enabled to make, in various situations, and with great accuracy, will illustrate this point. Otter Peak, in Virginia, the loftiest point in this country, does not exceed 4000 English feet. In the same district, Jonathan Williams, proceeding from the spot where the tide ends above Richmond, and measuring the road to the first chain or Blue Ridge, found the height at Rock-fish Gap to be 1150 feet. A summit near this has been ascertained to rise near 1900 feet. Farther onward, near Staunton, in Virginia, he ascended a ridge of the Allegheny, 1898 feet in height. A second chain, called the *Calf Pasture*, was 2247 feet in height. A third ridge, that which separates the waters, six miles south-west of Red Spring, measured 2706 feet.

In Maryland, the following heights have been determined, in 1789, by George Gilpin and James Smith :

On the river Potowmack, from the rapids at Georgetown, where the tide ends, to the mouth of Savage river, in a course of two hundred and eighty English miles, the level is 1160 feet. In this estimate, the rapids are stated at 37 feet, and the Matilda cataract at 76 feet, including the rapids which extend three miles above.

From the mouth of Savage river to a place called Moses Williams, on the summit of the Allegheny, in a length of eight miles and three quarters, the level is 2097 feet. The whole height, therefore, from the level of the tide in Potowmack, is 3257 feet. The Allegheny, which I myself have traversed at this place, and where the elevation appears to be the greatest, does not rise more than 2430 feet above the ocean. The Blue Ridge, at Harper's ferry, at the mouth of the Shenandoah river, appears to be nearly of the same height as at Rock-fish Gap, so that the medial elevation may be computed at 1165 feet, which is less than half the height of the Allegheny in Virginia. The height of this mountain in Pennsylvania, above the plain below, is, according to Dr. Rush, about 1300 feet. Travellers, indeed, remark, that they reach the summit by gradual and almost imperceptible ascents. In New York state the highest point of the Katskill was found, by Mr. Peter de la Begarre, to be 3549 feet above the surface of the

Hudson, in which the tide extends to within a few miles of Albany.

In Vermont, the highest part of the chain is *Killington* Peak, and which was determined, by Samuel Williams, to be 3454 feet in height.

The White Mountains, in New Hampshire, visible at sea at the distance of thirty leagues, were estimated by Dr. Belknap to be 10,000 feet in height, but, by Mr. Williams' calculation, their elevation does not exceed 7800 feet.

The chain of the Allegheny can therefore be merely considered as a mound or rampart, whose height, at a medium, is 2000 or 2500 feet; and differing, in this respect, widely from the other great ridges of the globe. The Alps have been estimated at 10,000 feet, the Pyrenees at 7500, the Andes at 15,000, and Libanus at 9500. Hence it may be easily perceived, how much influence this mountain must possess over the atmosphere of the United States, and of the whole continent of North America; an influence which I shall hereafter more fully explain.

All European travellers have been struck, in surveying the American mountains, with the regularity of their course, the continuity of their ridges, and, in the line formed by their summits, with a much slighter undulation than the mountains of our hemisphere exhibit. This peculiarity is particularly observable in Virginia and Maryland, in the Blue Ridge. This ridge, which I traversed from the frontier of Pennsylvania to James River, every where presents to our

view a terrace, 1000 or 1200 feet in height above the plain at its feet, with a very steep side, and a summit that can scarcely be said to undulate at all, and with occasional gaps or breaks. The mountain rises from a basis from five to six miles broad. In going north, this summit lowers, as well as that of the parallel ridges; and as some confusion of names has arisen in Pennsylvania from its *bifurcations*, I shall endeavour to determine them with accuracy.

We clearly distinguish, in Virginia, three principal ridges: which are—

1. The *Blue Ridge*, situated eastward, which takes its name from its bluish appearance, when viewed at a distance, from the plains. Evans and some others call it, without any good reason, the South Mountain. The names of mountains, indeed, in the United States, have been generally conferred by the colonists at random, and as mere caprice directed. The Blue Ridge is detached from the great bow or knot of the Allegheny. It is the immediate elongation of this chain, in coming from the south. It crosses James River above the junction of its two higher ridges, the Potowmack above the Shenandoah, the Susquehannah above Harrisburg; and the latter river is observed to be thus far navigable, flowing over a calcareous bottom, but it is here made impassable by the sand stone rocks of the Allegheny. In Pennsylvania, this ridge becomes less continuous and less lofty, and is known by the various names of the Trent, Flying, and Oley hills, but it is the same

chain which crosses the Schuylkill at Reading, and the Delaware above its bifurcation near Easton, and from thence it proceeds till lost in the groupe of the Katskill, near the banks of the Hudson.

The second chain, called *North* Mountain, with as little reason as the former is denominated the South, detaches itself also from the great *bow* of the Alleghenеy, and holding a course westward, but parallel to the former, traverses the higher branches of James River, ten or twelve miles above their junction; the Potowmack, twenty-four miles above the Shenandoah; but when it touches the western branches of the *Great Connegochiegue*, it divides itself into several branches, and its subsequent course is not easily traced. Some geographers discover this ridge in the Tuscorora Mountains, which, after having traversed the Juniata, is lost among the swampy and rocky deserts, north-west of Susquehannah. Others trace the North Mountain in the *Kittatinni*, which moves parallel to the Blue Ridge, and proceeds to the Delaware, which it crosses above its south-west branch, and to Nazareth, after which it forms the eastern bank of that river, till it terminates, like the Blue Ridge, in the groupe of the Katskill, and the hills which divide the fountains of the Delaware from the course of the Hudson.

In Pennsylvania, the Blue Ridge is usually confounded with the North Mountain, because their features are pretty much the same. Each district applied the term *blue* to the highest summits, and

bestow peculiar and various names on the lesser branches, but the geographical connection of the North Mountain by the Kittatinni, and of the Blue Ridge by the *Oley* and *Flying Hills*, appears to me to be well established by the similarity of their substance, and their concurring to form a calcareous valley, which runs uninterruptedly between them, from the Delaware and the neighbourhood of Easton and Nazareth, to the sources of the Shenandoah, near Staunton.

The third principal chain*, or the Allegheny, properly so called, is the westermost and loftiest ridge, by which the waters are uniformly divided, and which, not being broken into gaps, by any river,

* It is not without a careful examination of this point that I have deviated from Arrowsmith's example, who, totally neglecting the *Oley Hill* and *Flying Hill*, confounds, above Harrisburg, the Blue Ridge with the Kittatinni. This compiler may have been influenced by travellers, who, in their turn, were misled by the opinion popular in the country, and by the name of Blue Ridge, given by the people of some districts to the Kittatinni. Besides the authority of Evans, Fry, and Jefferson, which is certainly conclusive, I have also examined for myself. In traversing the Susquehannah, in the road from York to Lancaster, I surveyed a chain, a mile behind Columbia, which is plainly a continuation of the Blue Ridge, which had run, at a greater or less distance, on the west of my course. This chain, equally high on both sides of the river, leaves only a narrow passage for its current, which foams over a sloping and rugged bottom. This passage has evidently been forced by the river, as that of the Potowmack at Harper's ferry. It continues its course north-west, over a bottom which, behind Columbia, is calcareous.

justly merits the appellation of the *Endless Mountain*. Beginning at the southern extremity, we see it commence its long career at the corner of South Carolina and Georgia, under the various names of White Oak, Great Iron, Bald, and Blue Mountain. It there turns to the west some branches of the Tenessee, and to the east the rivers of Carolina, whose western limit is formed by it. Having reached Virginia, it forms the bend before-mentioned towards the north-west, and enfolds the ridges already described. It then renews its course north-north-west, pouring on one side the Monongahela and Great Kenhawah into the Ohio, on the other side the James River, the Potowmack, the Susquehannah, and many others, into the Atlantic Ocean. Towards the sources of the western branch of the Susquehannah, it diverges into several branches, the largest of which proceeds eastward, and traverses all the waters of that river, terminating in Katskill, near the sources of the Delaware. The eastern branches enfold the sources of the Susquehannah itself, or supply the Iroquois and Genessee lakes and rivers: unless indeed we trace their branches to a ridge more westerly, called the Gauley, the Laurel, or the Chesnut Ridge, which also terminates in this quarter.

Besides the three principal chains in Virginia, which I have just described, there are many intermediate ridges, equalling them in height, steepness, and *continuity*. Such are the *Calf-pasture*, the *Cow-pasture*, and *Jackson*, all which I passed in going from

Staunton to *Green-briar*. Among the latter are found those hot springs, famous in Virginia for their sanative qualities, and distinguished by the names of *Warm Spring*, whose temperature is mild; *Hot Spring*, whose temperature is higher; and *Red Spring*. Warm Spring, which I have examined, is of an ammoniacal sulphureous nature, whose heat is 20 degrees of Reamur. It rises at the bottom of a deep valley, shaped like a funnel, and easily perceived to be the crater of an extinguished volcano.

West of the Allegheny, towards the *vale* of the Ohio, there are many remarkable hills. The first of these, called Reynick, and the High Ballantines, eight miles west of Green Briar, appears to me as lofty, though not so broad as the Blue Ridge. From this height may be discovered, in the south-west and north-east, a crowd of other hills. Fifteen miles further, by a winding road, I passed over eight or ten ridges, which continued for thirty-eight miles, till I reached the Gauley Ridge, which is the loftiest, the steepest, and the narrowest, at the summit, of them all. I regard this whole extent as a single elevated platform. Besides the Gauley Ridge, we meet with no heights but such as regulate the course, and sometimes constitute the bed of rivers, but I observed that the channel of the Great Kenhaway often made a circuit through a country more rugged than any I ever met with. Most of these ridges tend towards the Ohio, and some of them may be suspected to cross it. The Gauley Ridge originates among the foun-

tains of the Great Kenhawah. South-west of the Bow of the Allegheny, and under the name of Laurel Hill and Chesnut Ridge, it ranges northward as far as the sources of the Susquehannah. Southward, the people of Kentucky and Tenessee have given to the great branch which divides Kentucky from Virginia the name of the *Great Laurel*, and that of *Cumberland* to its continuation along the side of the Cumberland river to its mouth. I have not been able to collect sufficient information as to this region. The American government might easily obtain a complete knowledge of the country, by obliging all their surveyors to submit themselves to the examination and superintendance of the college of William and Mary, at Williamsburg, and to add a few topographical particulars to the present barren returns. They might thus, in a few years, obtain materials for a complete exhibition of their rivers and mountains.

I shall now proceed to give some account of the interior structure of those mountains; of the nature and arrangement of their strata. Though my information will be very defective, yet I trust that, as far as it goes, its novelty and accuracy will somewhat gratify those readers, who assign to the science of physical geography that importance which it justly claims.

Fig. 3.

Fig. 1.
Strata.
9 miles E. of Ohio. at Louisville on Ohio

Fig. 2.

INTERIOR STRUCTURE.

During my different journies in the United States, I was careful to collect specimens of those mineral substances which appeared to prevail most extensively. Being frequently obliged to travel, for many days together, on foot, I was able to procure only small masses, but such, however, as sufficiently corresponded with my views. These specimens, arranged and compared, at Philadelphia, with others, possessed or presented to me by other enquirers, has enabled me, with the aid of some learned mineralogists, to draw up, at Paris, a kind of physical geography of the United States*.

With these materials, I have been able to distribute, with sufficient certainty, the region comprised between the Mississippi and the Atlantic Ocean into the five following districts:

I. THE GRANITE REGION.

The first region, which is that of granite, is bounded by the Atlantic Ocean, from Long Island to the mouth of the St. Laurence; by a line ascending that river to Lake Ontario, or rather to Kingston or Fron-

* These specimens are now in the collection of Citizen Metherie, editor of the Physical Journal, at Paris.

tinac, to a spot called the *Thousand Isles;* proceeding thence along the Mohawk, from its source to the Hudson, and, by the course of that river, back to Long Island, the point of setting out. Through all this space, the superficial soil is bedded in a mass of granite, which forms the great body of the mountains, and with which strata of a different nature are very sparingly mingled. This substance shows itself upon the surface, in the neighbourhood of New York; it forms the *nucleus* of Long Island, on which the sands have been accumulated by the sea. It ranges uninterruptedly along the coast of Connecticut, Rhode Island, and Massachusetts, with the exception, however, of Cape Cod, which is a heap of sand, brought thither by the gulf stream. The granite still continues to form the shore of New Hampshire and Maine, where it is mingled, in a slight degree, with sand stone or grit, and with lime stone, the last of which is, chiefly as a manure, an article of considerable trade. It forms the rocks and promontories of Acadia, or Nova Scotia and New Brunswick, and the nucleus (or kernel) of the mountains of Notre Dame and Magdelaine, that rise near the mouth of the St. Laurence. The banks of this river are generally composed of *schist*, but granite continually shows itself in detached rocks and masses. We find it also in the neighbourhood of Quebec; in the rocky mass which forms the basis of the citadel; in the high mountains north-west of the city; and under the cataract called *Montgomery Falls*, which is a small

river flowing from the north, and falling into the St. Laurence, over a shelf forty-five feet in height. The immediate bed of this fall is calcareous, in horizontal strata of a dark grey colour, and of that kind called primitive or crystallized. The upper banks are of a light brown granite, in strata almost vertical. Indeed, wherever it is found near the St. Laurence, its beds are more or less inclined, and never parallel to the horizon. On the right bank of this river, opposite Quebec, there abounds a granite, red, black, and grey, the same of which the state-house at Boston is built, and which is found in the environs of that town. It is likewise similar to the rock brought from the Russian lake Ladoga, which forms the pedestal of the equestrian statue of Peter the first, at Petersburg. The isle, on which Montreal is built, is calcareous, but the adverse bank of the river, which enbosoms it, is formed of blocks of granite, that have doubtless rolled from the neighbouring heights. The same substance forms the summit of *Belle-Isle* Mountain, as well as the ridge of the *White Mountains*, of New Hampshire. The secondary hills of New England are mostly of granite, except those around Middleton and Worcester, which are of *grit*. I am likewise assured that the western branches of the *Green Mountain*, and those of Lake Champlain, are, for the most part, calcareous, though the rocks of Ticonderoga are of *grit*, while the eastern branches, which spread over Vermont, are of granite. It appears, upon the whole, that granite pervades the country near Lake George,

forming the isthmus which separates the Hudson and its tributary streams from that lake, and ascending to the sources of these streams, and of the *Black River*. From thence it is diffused as far as the St. Laurence, the *Thousand Isles*, and Frontinac, where it is of a reddish hue, crystallized in large masses, and abounding with feld spath. Alexander Mackenzie, in his Travels, lately published, will enable us to trace it still farther north. This judicious observer, whom I knew at Philadelphia, tells us, that a greyish dusky granite is found throughout the country which extends from Lake Winnipeek to Hudson's Bay, and, according to report, throughout all the region lying between that bay and the Sea of Labrador; and consequently we are justified in saying, that all North America, above Long Island, is a rock of granite.

Mr. Mackenzie likewise informs us, that calcareous rock, in thin layers, disposed nearly horizontally, and of a soft, yielding texture, are found upon the eastern banks of Lake Dauphin, of Lakes Castor, Ceder, Winnipeek, and Superior, as well as in the beds of all the adjacent and contiguous rivers. He adds, that in the narrowest part of Lake Winnipeek, a breadth of only two or three miles, the western shore is bordered with a calcareous rock of the same loose texture, rising to a height of thirty feet, while the adverse or eastern shore is lined with lofty rocks, of the before-mentioned granite.

From this view, it follows, that the calcareous region, which is spread out westward of the Alleg-

heny, extends, north-west, as far as Lake Michigan and the fountains of the Mississippi; from thence to the sources of the Saskatchewaine river, thus rejoining the grand chain of the *Stony* or Chippewan Mountains, which are only a continuation of the *Cordillera** of the Andes. "We may remark," says Mackenzie, "that it is in the line of contact with those immense chains of lime stone and granite which embosom the vast lakes of North America." This curious and important fact is truly worthy the attention of philosophers†.

Returning southward from the river St. Laurence, granite is every where found in the county of Steuben, as far as the sources of the Mohawk, whose course it accompanies, without crossing it, except at the little falls above Skenectada. We lose sight of it, however, at the grand cataract of the Cohoeze, where the river rolls over a bed of serpentine, a stone which greatly prevails throughout the *South-west* Mountain‡, and particularly near Monticello, in Virginia. It re-appears above Albany, on the eastern shore of *Hudson*, which river flows between rugged banks, covered with stunted oaks and meagre firs. Twenty miles above Poughkeepsie, commence those

* Spine or back-bone.—TRANS.

† The channel of the Mohawk separates the granitic from the sand stone country.

‡ This ought rather to be called the Red Ridge, on account of an argillaceous earth of this colour, exactly similar to what we find at Aleppo, in Syria.

transverse ridges, rocky and sterile, which forcibly remind us of Corsica and the Vivarais. They extend for a length of twenty-five miles, and are every where roughened by mishapen blocks of greyish granite, in strata of forty-five or fifty degrees of inclination, covered with moss and dwarfish evergreens. These banks are similar in their appearance, as far down as West Point, where the river passes through the last of these transverse ridges. Here terminates the region called the Highlands, and begins the low, level, and maritime country, which continues to New York. In this latter course, the left bank of the river is composed of masses of granite, so disposed upon the surface as to make it probable that they are sunk very deep below it.

The enquiries of a mineralogical society, established at New York, have ascertained that the district round New York, the river Hudson, and Haarlem river is bottomed upon granite, and that this substance forms the principal hills which stretch into New Jersey. The direction of the strata, especially below Connecticut, is from north-east to south-west, which is a line parallel to the coast. Their inclination is nearly vertical, and the ridges of this substance are supposed to extend into Vermont. Dr. Mitchill, in the accounts he has given relative to these points, in 1797, observes, that from the sea to West Point, which is a low and maritime country, the rock is composed of quartz, feld spath, schorl, mica, and granite, sometimes in nodules, and sometimes in

leaves; that the granitic region ends abruptly on the Hudson, at Pollepelle Island, opposite the great rock at Fishkill, twenty miles below Poughkeepsie; and that, at the distance of forty rods farther, begins the schistous region, which emerges to view on the banks of the river, so as to suggest the belief of its serving as a bed to the granite. It is conjectured that the former substance extends to Albany, and forms the basin of the Cohoez, which, however, cannot be admitted, unless we call by the name of schist that serpentine, of which I brought away a specimen. In this schist, Dr. Mitchill tells us, are imbedded all the calcareous masses scattered over the country. He mentions a block of this kind one mile from Claverac, and four from the town of Hudson, which presents a surface of eight hundred acres, full of marine shells, wholly dissimilar from those of the neighbouring sea, which is distant about a hundred and forty miles. Dr. Mitchill likewise mentions other calcareous masses near New York, where the high lands separate the waters of the Sound from those of the Hudson. He thinks that, at some remote period, the ocean covered all these spaces, and his opinion is corroborated by the nature and condition of the Katskill Mountains.

The Katskill he found to be composed of the same sand stone or grit which constitutes the Blue Ridge, of which he deems it to be a branch. We are thus enabled to fix the boundary, on this side, between the granite and the sand stone, which forms the second

region. This sand stone reposes, at Katskill, upon a bed of soft slate, which, when burnt, emits a strong bituminous smell, and whose strata are sometimes irregular, and sometimes inclined in an angle of from fifty to eighty degrees. He considers this substance as the primitive one, because granite and grit contain no petrifactions, but, on the contrary, possess the following distinguishing appearances :—1. The rocks are formed of gravel, of pebbles, of red and black quartz, of red and grey jasper, all evidently rounded and smoothed by friction with water. 2. Their strata are all regular and horizontal. 3. The petrifactions are shells, which, excepting the clam and the scollop, are unknown in the neighbouring seas, are found upon their summits, in a mass of clay and pebbles. These appearances have led this philosopher to conclude that there were three periods in the growth or formation of this region. At the first period, the sands were collected and deposited; at the second, the waters overflowed and settled on it; at the third period, shell-fish were generated.

It is also remarked, that the steep side of these mountains looks toward the west, while the eastern side is a slow and easy descent. In the granitic region, which I have just described, there are some remarkable deviations from this rule. A different arrangement is found in the mountains between Sunbury and Harrisburg, on the Susquehannah, composed chiefly of this kind of stone ; in a vein of *granitic talc*, or isinglass, of which I shall speak hereafter ;

and in numerous masses at the foot of the South-west Mountain, in Virginia.

II. THE GRIT OR SAND STONE REGION.

The grit or sand stone of the Katskill forms the characteristic feature of the second region, which comprises the mountainous country of the Blue Ridge, the Allegheny, and Laurel Hill, the sources of the Kenhawah, the knot or bow of the Allegheny, and, generally, all the southern chains, as far as the angle of Georgia and the Apalachi. I lost the track of it westward, in the state of Tenessee and the Cumberland Mountain, and cannot mark its junction with the calcareous region with any certainty. In the north and north-west, its limits appear to be those of the sources of the Susquehannah, of the Genessee lakes, and generally the right bank of the Mohawk and Hudson. Dr. B. S. Barton, of Philadelphia, who, in returning from a journey to Niagara, in 1797, traversed the higher parts of Pennsylvania, continually met with grit from Tyoga to within nine miles of Nazareth. Mr. Guillemard, in his journey from Philadelphia to Pittsburg, through Sunbury, never lost sight of this substance till he passed the Allegheny, a few calcareous vallies excepted*.

* The country of the upper Susquehannah is composed of schist, schorl, and feld spath, and is cut up by a series of hills of moderate height, which ascend by degrees to the Allegheny.

In Virginia, from Charlotteville to Gauley river, I myself observed grit in great abundance, in the ten or twelve ridges which I passed in succession, intermingled with the calcareous vallies of Staunton and Green Briar. Sometimes this grit gives place to a milk-white quartz, which abounds on the Blue Ridge as you go from Fredericktown to Harper's ferry, and sometimes to a grey quartz, which is the *nucleus* of the Blue Ridge, at the chasm formed by the passage of the Potowmack through it. In this chasm some of the rocks are granitic, but these are sparingly scattered.

The sand stone mountains are less naked and bare of vegetation than might beforehand be naturally expected. I found their highest tops, in Virginia, between Green Briar and Gauley rivers, covered with the lofty trees and luxuriant herbage which decorate the fat and prolific vallies of Kentucky. The high country which extends beyond Fort Cumberland, from the heads of Potowmack to those of Yoghogheny, known by the name of the *Green Glades*, is a genuine Swiss country, rich in pasture, whose luxuriance is sustained, in summer, by the rains and mists, which at that season are wanting on the plains. This circumstance is owing to an elevation of about twenty-four hundred feet. These advantages, however, are not

Here grit predominates. There occasionally appear veins of basalt, the products and proofs of ancient volcanoes. Every where the vegetation is feeble and stunted.

shared by the Gauley Ridge and Laurel Hill, which are stony and dry. Evans, the geographer, estimates the cultivable portion of their surface at one tenth of the whole, and his extensive surveys entitle his conjectures to some credit. These cultivable spaces are only found in the vallies, enriched, as all vallies are, by the soil and leaves washed or blown down from the adjacent heights.

In the north-west quarter, about the Genessee lakes, and the Lakes Erie and Ontario, the grit terminates in a region of schistous slate and of blue chalk, so considerable as to form the bed, or bottom and sides of these lakes. These substances spread themselves over the strata of coal, found in western Pennsylvania. This chalk is replete with marine shells. We find these schistous masses at Niagara, and all along the Great River, as far down as Quebec. We have already seen that, for the most part, it paves the channel of the upper Hudson. These are the boundaries of the great schistous region; elsewhere it is only occasionally visible.

Besides this vast realm of sand stone, some spots of the same nature are scattered through the granitic and calcareous regions. Such is the district of Worcester, in Massachusetts, the largest detached region of chalk I have met with, for I could not trace any connection it possessed with the Allegheny.

III. THE CALCAREOUS OR LIME STONE REGION.

The third or calcareous region comprises all the western country, beyond the mountains, and extends itself, as Mackenzie informs us, north-westward, across the rivers and lakes, to the heads of Sakachee river, and the Stony or Chipewan Hills. The portion that has fallen under my own view, and which lies between the Tenessee and the St. Laurence, and between the mountains and the Mississippi, is an immense rock or bed of *lime stone*, disposed horizontally in lamina or layers, of one or more inches in thickness, of a close and firm texture, and generally of a grey colour. In the north, this stone is of the crystallized or primitive kind. This stratum is overlayed sometimes by clay, and sometimes by gravel. Above all, at the surface, is a mass of black mould, which is more abundant and of greater depth, sometimes fifteen feet, in the vales and bottoms, and shallower and more scanty in the slopes and heights, where it sometimes dwindles to a depth of six or eight inches. This circumstance, as well as the foliated form of the stone, bears testimony to the ancient influence of the waters of the ocean.

In the country round Pittsburg, on the Ohio, in the district of Green Briar, on the Kenhawah, and throughout Kentucky, an examination always leads to the grand calcareous foundation. I have seen it naked in the channels of all the brooks and rivers

from the Kenhawah to the rapids of Ohio, near Louisville. On the road from Cincinnati to Lake Erie, it is found to be the flooring of the Miami and Clay Rivers. Lake Erie is probably bottomed upon a dark-coloured schist, but specimens are continually found of calcareous substances. A lime stone rock forms the cataract of Niagara, extends itself into the Genessee country, and accompanies the river to Quebec. In this northern quarter, the calcareous substance is crystallized, as appears from the specimens brought up by the settlers in sinking their wells.

The breaches made in this stratum or rock give rise to the funnels or pits before-mentioned, which swallow up the rains and rivulets. I met with curious instances of this nature near Green Briar, in Virginia, and at *Sinking Spring*, in Genessee, where a spring appears at the bottom of a pit, and, after a course of only six feet, sinks again into the earth. To these subterranean waters may be attributed the currents of air found in some caverns, of which Mr. Jefferson has given an example, in the mountain called the *Calf Pasture*.

From Louisville to the White River, where it ends abruptly, the naked lime stone rock may be seen through the limpid course of all the streams. On reviewing my specimens, some American travellers have assured me, that the Holdston, a northern branch of the Tenessee, flows over rocks of the same nature. I regret exceedingly that I had no suitable means of

ascertaining the nature of the country beyond, in Georgia and Florida.

At Louisville, the first layer or stratum, on the lofty bank of the river, is a black earth, three feet thick. Under this is a mass of thin sand, from fourteen to fifteen feet thick, *without any marine exuviæ;* but below this is another layer of sand, six or ten inches thick, which contains these remains: from thence to the bottom of the river is a stratum of large, heavy gravel. The whole bank is twenty-five feet high.

Four miles east of Louisville, as we go back into the country, the superficial soil is about twenty inches in depth. Farther onward, and four miles from Frankfort, we meet with it no deeper than fifteen inches. At these places, this layer of mould reposes on a mass of clay, from twenty-four to thirty-six inches deep, which is not found near the river. Under this clay is the lime stone, which may with difficulty be pierced through, till we find a bed of gravel and clay, where the waters, not drained off by wells, are suspended.

At the spot above-mentioned, near Louisville, the rock is three feet thick, and water is found ten feet below the surface. At other places, the thickness of the stratum is greater. The rocks which form the rapids of the Ohio, below Louisville, belong to this great calcareous bed. In these lower masses, at their surface, are found a great number of petrifactions,

not incrusted in the mass, but brought thither from above. I never met with any petrifactions in the body of this calcareous stratum, a circumstance that more surprised me, because, near Frankfort, in traversing the top of a high ridge, about a hundred feet above Elkhorn creek, which crosses it, I found in the woods a great number of large stones, composed of entire marine petrifactions. At Cincinnati, on the banks of the Ohio, the same kind of petrifactions again appeared. Dr. Barton has also collected specimens of the same substance on the heights of Onondago, in the state of New York, more than 575 miles distant, with this slight difference, however, that *his* specimens are of a blue slate, while mine are of a rose-violet, colour.

On my return to Paris, I submitted these petrified shells to the examination of one of our most skilful naturalists, M. Lamark; and I cannot do better than to insert, in this place, his account of them, in his own words:

"I have carefully examined the fossil specimens with which you have entrusted me, and which you collected in North America.

"I cannot hesitate to refer them to the *terrèbratula* genus of fossils, in irregular masses. This is a new genus, explained in my system of *Animals without Spine*. These almost all of them belong to that class which are grooved or fluted longitudinally from top to bottom, like those which Linnæus has

denominated *anomia dorsata*. In these specimens, we see nothing but the interior mass, the stony or concrete substance with which their cavities have been gradually filled up, during their long abode in the bowels of the earth. We nevertheless still find on many of them small whitish fragments of the primitive shell itself.

" In the specimen from Cincinnati, we may distinctly trace three kinds of fossil shells: first, a species of terrebratula with large grooves or flutings, and which resembles the figure given in the New Encyclopædia, pl. 241, fol. 3; secondly, a species not grooved or fluted, but jagged or notched; and thirdly, a bivalve shell, with a few jaggs, which I cannot assign to its proper genus, not being able to examine the joint.

" In the sample from Kentucky, taken from a height of a hundred feet above the water, I have noticed shells of different ages, all terrebratula of the fluted species, which approach nearly to those exhibited in the New Encyclopædia, pl. 242, fol. 1. Its flutings are more numerous and minute than in the former specimen. One of them, of a somewhat triangular shape, has a groove or channel, on the top of the largest shell, nearly resembling that we meet with in pl. 244, fol. 7. The other terrebratula, in the same sample, is large, and flattened like a card, but it is a fragment too imperfect to allow us to ascertain its nature. It contains a fragment of belemnite.

" After carefully considering these specimens, it is clear to me, that the districts of North America which furnished them have formerly been covered by the sea*, or at least they point out that portion of the surface which has once been the *bottom*, and not the *banks* of the sea; for they all belong to the class of pelagia (see my Hydrogeology, pp. 64, 70, 71), which, like the gryphytes, ammonites, orthoceratistes, belemnites, encrinites, &c. are found only at the greatest depths of the sea, and never near the shore. The greatest part of the shells are only known in a fossil state. On the whole, your enquiries have ascertained the mineralogical state of North America, as far as can be conveniently done, and justify us in concluding that, among its mineral substances, none of the *littorral* shells are to be found."

Besides the western country, and the region I have just described, there are only two calcareous districts, of any considerable extent. One is the valley formed by the ridges of the Blue Ridge and North Mountain, from Delaware, above Easton, and Bethlehem, to the sources of the Shenandoah, and even to the great

* In support of this opinion, we may mention the *salines*, salt pools, or salt licks, as they are called in America, which are found every where throughout the western country. The richest of these is near Lake Oneida, where the fluid contains one eighteenth of the whole weight in salt. The northern seas contain but one thirty-second part, and those within the tropics one twelfth.—These salt lakes or pools are seldom to be met with on the Atlantic coast.

bow of the Allegheny; for the county of Bottetourt, which occupies the latter region, is called the lime stone county, because it supplies with this material all the country east of the Blue Ridge, where none is to be found. Rockbridge likewise is chiefly calcareous, as well as the banks of the Shenandoah, as far as the Potowmack.

A second part of this valley, that which extends from the Potowmack to the Susquehannah, is watered by Great Connegochiegue and Connidogwinnet, and contains the fertile districts of Chambersburg, Shippensburg, and Carlisle. The third part, stretching from the Susquehannah to the Delaware, is watered by the Swatara, crosses with some breaks the branches of Schuylkill, and ends at Easton and Nazareth, whose soil is not unfertile. Its north-east limit is the Kittatinni Ridge, an elongation of the North Mountain; its south-east boundary is the ridge known by the various names of South Mountain, Flying Hills, and Oley Hills, but which is no more, as I have already proved, than a direct continuation of the Blue Ridge. The boundaries of this great calcareous valley, extending from the bow of the Allegheny to Easton, in two lateral ridges, evince the truth of my former details on the course and continuity of these mountains.

The second calcareous district, contiguous to the former, lies on the opposite or eastern side of the Blue Ridge, from the *gap* of the Potowmack to the neighbourhood of Schuylkill, in Lancaster county.

Its south and south-west limits are formed by the Potowmack and the channel, which it does not cross, of the *Great Monocassi.* It comprises the district of Fredericktown, the course, for the greater part, of the Patapsco, and the counties of York and Lancaster, which are justly deemed the granaries of Pennsylvania. It is lost between Morristown and Roxbury, on Schuylkill. The rest of its skirt, from the Monocassi to Schuylkill, does not coincide with the ridge of the high land, though it forms a line of separation between many streams, and it does not assume that regular vale-like form, by which all the other calcareous districts are distinguished.

Between the calcareous substances of these two districts and that of the western district, there are two remarkable differences. The masses, in the east, are generally of a deep blue colour, and abound with veins of black quartz; whereas the western lime stone, especially in Kentucky, is grey, and of a pure and even grain, and foliated texture.

The western stratum is nearly horizontal, and forms the country into a sort of immense flat table. In the eastern district, especially at Rockbridge, Staunton, Fredericktown, York, and Lancaster, and as far as Nazareth, the strata is generally broken and irregular. When found regularly inclined, the inclination is most commonly from 40 to 50 degrees. A remarkable exception, however, to this rule will be found in the valley between North Mountain and the Blue Ridge, where the angle is always

less than 45 degrees, while near Lancaster, York, and Fredericktown, exclusive of the mountains, the angle is most frequently above 45 degrees, and this holds as to all the strata, be they granite or grit, which are less inclined in the mountains, and whose inclination increases as they approach the sea. At the falls of Schuylkill, near Philadelphia, the inclination of the talc is 70 degrees; at the Hudson river it is 90 degrees.

From these facts we are led to conclude, that the Atlantic coast has been shaken and overturned by earthquakes, to which we shall hereafter show it has been subject, while all the country westward of the Allegheny has been undisturbed. Thus, I am assured by Dr. Barton, that words corresponding with earthquake and volcano are familiarly used by the aboriginal natives of the east, whereas no such terms can be found in the languages of the western tribes, volcanoes being commonly connected with earthquakes; and accordingly we find basaltic masses in the vallies of the Allegheny. Whether there exist any ancient craters is worthy of particular enquiry. I cannot say whether there be any fossil shells in the eastern lime stone; I only know that they have been found in the primitive lime stone, adjacent to Lake Ontario and Niagara.

We occasionally light upon calcareous veins and branches, at a distance from the principal regions. One of these, in the district of Maine, furnishes a great deal of lime. Rocky Point, on Lake Champlain, is likewise calcareous, and no doubt it is to be

found in other parts of this lake. It occurs in the neighbourhood of New York; but the most remarkable instance that occurs, in the southern states, is a vein whose medial breadth is forty-five feet, but which is sometimes no broader than ten feet, but whose length is upwards of two hundred miles, which is met with between the Potowmack and the Roanoke. As this vein is generally at the surface, and supplies the neighbouring inhabitants with lime, its course can be traced with certainty. It does not deviate more than four or five miles from the Red or South-west Mountain, to which it is parallel.

IV. REGION OF SEA SAND.

The fourth region, formed of sea sand, comprises all the maritime plains, from Sandy Hook, opposite Long Island, to Florida. The interior boundary of this sand is a ridge or bank of granitic talc, or isinglass, called, by the Swedish traveller Kalm, glimmer, which runs parallel to the coast. This bank or ridge shoots out from the extremity of the granitic ridges on the right bank of the Hudson, and perhaps even of that which faces Long Island. This latter ridge, I have no doubt, is continued under water for a length of five hundred, and with a breadth of from two to five miles, as far as the Roanoke, in North Carolina. In all this course, this border ridge, as Evans has well observed, is marked by the cascades, which the

rivers form in flowing over it. These falls are the limits of the tide waters. Thus this talcy ridge strikes the Delaware at Trenton; the Schuylkill six miles above Philadelphia; the Susquehannah above the mouth of Octoraro; Gunpowder creek above Joppa; the Patapsco above Elkridge; the Potowmack above Georgetown; the Rappahannock above Fredericksburg; the Pamunkey below its two branches, fifty miles above Hanover; James River at Richmond; the Appamattox above Petersburg; and the Roanoke above Halifax.

Between this bank and the sea, the surface, in a breadth of from thirty to a hundred miles, is composed of sand, evidently deposited by the sea, which once flowed at the foot of this bank. At the mouths and on the borders of rivers, some clayey particles, washed from the mountains, are mixed with the sand, and form a fertile soil. The geographer, Evans, discovered a subterraneous stratum of yellowish clay, from three to four miles in breadth, lying lengthwise between this ridge and the sea shore, and which, by giving consistency to the neighbouring sands, make them suitable for bricks, as we find near Philadelphia. With these two exceptions, the sand resembles that of the adjacent sea, and is a fine black sand, twenty feet in depth.

Peter Kalm, a Swede, who travelled in America in 1742, observes, that in Pennsylvania and New Jersey the strata are as follows:

1st, Vegetable earth, ten or twelve inches.

2d, Sand mixed with clay, from six to seven feet deep.

3d, Gravel and round pebbles, containing clam and oyster shells, of the same kind as those in the neighbouring sea.

4th, A bed of black mud, full of reeds and trunks of trees, whose depth he has not given us. This bed, which taints the water of the wells, is found, at Philadelphia, at a depth between fourteen and eighteen feet; at Racoon, in New Jersey, between thirty and forty feet: at Washington city, I have myself seen it at the depth of eighteen feet, at the house of Mr. Law, where a well has been spoiled by it.

5th, Below all these strata is a bed of clay, which admits not the water to pass through it. I shall be asked, perhaps, on what foundation this clay rests; but I have had no means of ascertaining this point; and we may as well stop here, without the trouble of proceeding till we find, like the Hindoos, the tortoise which bears up the world upon its back.

When we consider that the interior bed or *nucleus* of Long Island is a granitic talc; that the rocky points and cliffs which occasionally show themselves along the coast, as far as Chesapeake Bay, and even down to Norfolk, as well as the rocks at Cape Hatteras, are of the same substance, one is disposed to consider it as the universal sub-stratum of the sandy region. But the inclination of these strata, in the line of the cascades, which is 70 degrees to the fall of Schuylkill, and never less than 50 degrees east and west of

that point, tends still more to prove this substance to be the basis of the inner region, which is overlaid with the substances already described. We may further remark, that this *talc* contains a large proportion of mica in the countries south, and of schorl in those northward of this coast.

V. REGION OF ALLUVIAL OR RIVER-FORMED SOIL.

The remaining region is the country which undulates beyond this ridge of talc to the foot of the sand stone or granitic mountains. This limit is traced with most difficulty in western Georgia, where the vein of *talc* does not show itself. This surface is distinguished by its risings, sometimes into long waves, and sometimes into round and insulated eminences; by the variety of its earths and stones, sometimes confused, and sometimes arranged with regularity, and which appear and disappear many times successively, from the mountains to the maritime plain, always bearing the appearance of having been brought gradually down, by the rains and rivers, from the heights; and such, in truth, is the origin of all this country. When we calculate the volume, the rapidity, and the number of these streams; of the Delaware, Schuylkill, Susquehannah, Potowmack, Rappahannock, York and James Rivers, &c.; when we observe that, long before their mixture with the ocean, they spread themselves to a breadth of from

half a mile to three miles, over a bottom from twenty to sixty feet deep; that, in their annual floods, they rise sometimes to a height of twenty feet above their ordinary level, we shall easily perceive what immense portions of earthy matter must be carried about, especially as, in former ages, the mountains must have had a greater elevation, and, of course, given greater swiftness and force to the torrents; that the forest trees, torn up and carried off by thousands, added to their destructive course; that the ice, accumulated by six months of winter, forms vast mounds, such as took place, in 1784, in the Susquehannah, at M'Call's ferry, near Columbia, when a barrier of this kind, more than thirty feet high, was formed by the *breaking up*, and laid the whole valley under water. At these periods, when the ocean bathed the foot of the mountains, of which there are every where manifest traces, the higher mountains, as yet undiminished by the loss of those particles, of which time and the torrents have since despoiled them, augmented the motion and force of the descending waters, by the height and abruptness of their points. Their summits, being colder, were covered with deeper snows for a longer time; and when the heats of summer, shorter no doubt, but not less intense, than at present, dissolved these snows, the torrents thus formed involved a greater quantity of earth, hollowed out deeper channels, and bore away trees with their roots, and large masses of the soil connected with their fibres, all which they deposited in the lowest shelves of the

mountains. In following years, new wrecks accumulate and clog the ancient channels: the torrents, impeded thus by mounds of their own creating, have their volume and their impetuosity augmented, till they find their way through the weakest part, and carry the softer matters onward by new channels, while the more ponderous fragments remain behind. By a process of this kind continuing incessantly for ages, the beds of ancient torrents enlarge gradually into vallies, and what were once sharp edges or hard bottoms of the stream, become slopes and plains. The waters descending from level to level, and leaving at each resting place their grosser matters, gradually deposit the lighter and more soluble, thus circumscribing the ocean by continual accessions of sand, mud, and pebbles, all of which are arrested and bound together by the trunks and branches of trees.

The Mississippi offers a luminous example of all these operations. It has been computed by M. Liancourt, that between 1720 and 1800, a period of eighty years, this river has advanced its banks fifteen miles into the sea. Thus, under the eyes of three generations, it has raised a new country from the sea, which daily encreases, and where beds of coal are slowly forming and accumulating for the use of future ages. So rapidly does this deposition take place, that, at New Orleans, three hundred miles above the actual mouth of the river, a canal lately dug by the Baron de Carondelet, between Lake Pontchartrain and the Mississippi, has brought to light a sub-stratum of

black earth, mixed with remains of trees, which have neither had time to be decomposed nor converted into coal. The two banks of the river are entirely composed of trunks of trees cemented together by mud, for a length of upwards of three hundred leagues, to the height of twelve or sixteen feet. Hence it is that the vernal inundation, which swells the river thirty feet above its ordinary level, and overflows the adjacent country, which is lower than the bank, is hindered from entirely returning, and stagnates into immense marshes. These swamps are a present bar to culture and population, though hereafter they may supply the means of inexhaustible fertility.

LAKES THAT HAVE DISAPPEARED.

In the structure of the mountains of this country, there is another circumstance, more remarkable than any yet mentioned, by which the force of the waters is greatly increased, and their course diversified. When we attentively examine the strata, and even the surveys of these regions, we observe that the principal ridges of the Allegheny proceed in a line perpendicular to the course of the great rivers, which have been obliged to open themselves a way through the solid mass of these ridges. This process is evident in the James, Potowmack, Susquehannah, Delaware, &c. these streams having surmounted the opposition of these ridges, before their entrance into the

low country. The most remarkable instance of this nature is the passage of the Potowmack, three miles below the Shenandoah. Coming from Frederick-town, twenty miles distant, I proceeded from the south-east towards the south-west, through a woody and uneven country. After crossing the first ridge, which, though of easy ascent, is quite distinct, I saw before me, eleven or twelve miles to the west, the *Blue Ridge*, resembling a lofty rampart covered with forests, and rent, in one place, from top to bottom. Re-ascending, over a rough and waving surface, which lay between me and the ridge, I found myself at length at the foot of this rampart, which appeared to me about eleven hundred feet in height*.

After emerging from among the trees, I beheld, in the body of this great wall, an immense rift or gap, about 4000 or 4500 feet in width. At the bottom of this *gap* flowed the river Potowmack, having on the left side, or that on which I was, a sloping bank, equal in breadth to itself, and on the right, touching the foot of the gap. On both declivities, from top to bottom, are scattered trees, rooted in the clefts and hollows, and partly concealing the rent. On the right, however, there is a considerable part of the declivity too steep to admit of trees, and which, being bare and exposed to the view, shows marks of the

* For want of time and of instruments, I was obliged to conjecture the height, from comparison of the summit with the known height of the trees at the bottom.

interior structure of the ancient wall. There appears a grey quartz, broken and chafed by the fragments rolled along by the torrent. Some considerable blocks, which have withstood the flood, still continue as its monuments, at a small distance. The bottom of the chasm is bristled up with rocks, which are worn away or removed by small degrees. The waters fret and boil up around these obstacles, which, for two miles, form dangerous falls or rapids. They were covered, when I saw them, with the fragments of a batteau, which had been wrecked a few days before, by which sixty barrels of flour had been lost. The temerity of the American navigators renders accidents of this kind as frequent in their rivers as on the ocean.

As we advance in this defile, the gulph narrows till nothing be left between the rock and the river but a waggon way, which is covered by the floods of spring and summer. The sides of the mountain abound with springs, whose descending streams interrupt this road in many places. As the hill consists chiefly of pure rock, of grey quartz, and sand stone, and even of granite, the canal which is projected appears impracticable. Three miles upwards, the river joins the Shenandoah, which proceeds from the left along the inner base of the mountain. Its breadth, at this place, I estimate at one third of that of the Potowmack, which may be reckoned at 650 feet. Higher upwards, we may cross the latter river at Harper's ferry, and go up a steep bank to the inn belonging to it. From this point of view, the gap appears like a deep canal,

where the eye meets nothing but rocks and trees, and cannot penetrate to the farther end of the chasm. In approaching it from Fredericktown, we see no traces of the grand prospect described by Mr. Jefferson. In conversing with that gentleman, a few days afterwards, he told me he had taken his description from the report of a French engineer, who, during the revolutionary war, had scaled the hill. At that height, I doubt not, the view was as spacious as the boundless horizon of a savage country could afford.

The more I consider the situation of the adjacent country, the more am I confirmed in the belief that the Blue Ridge was once entire, and by shutting the door against the river, forced it to expand into considerable lakes. The numerous cross ridges which succeed each other from Fort Cumberland, could not fail to establish this lake westward of North Mountain. On the other side, the valley of the Shenandoah and the Connegochiegue would naturally form a lake between Chambersburg and Staunton. As the level of these heights, whence these two above-mentioned rivers take their course, is much below that of the Blue Ridge and North Mountain, the lines of their summits must have formed the boundaries of this lake, which must have diffused itself southward as far as the great bow of the Allegheny. The two upper branches of the James River, barred up in like manner by the Blue Ridge, would augment this lake with all their waters, while, northward, the general level of the lake would find no obstacles to hinder its

extension between the Blue Ridge and the Kittatinni, not only as far as the Susquehannah, but even to the Schuylkill and Delaware. All the lower country, between the Blue Ridge and the sea, would be watered by the streams originating on the eastern side of the mountains, and perhaps by the overflowings of this great interior lake. In consequence of this state of things, the rivers would in general be smaller, and the surface more equal; the ridge of granitic talc or isinglass would arrest the waters, and turn them into bogs and swamps; the sea would flow up to this ridge, and occasion other swamps like that called the *Dismal*, near Norfolk; and, if the reader recollects the bed of black earth, mingled with rushes and trees, found every where, at certain depths, he will readily admit this hypothesis. Aided by earthquakes, which, as I shall hereafter show, were once very frequent throughout the maritime country, the waters, continually assailing and sapping the mountainous barrier, at length made themselves a passage through it. These passages, at first narrow and shallow, would speedily, by the action of mighty streams, be widened and deepened, till at length the breach would extend, as at present, from top to bottom, and the lake would be entirely exhausted. This operation would be by no means difficult, as the Blue Ridge, in general, is not a mass entire or crystallized in large strata, but a heap of separate blocks, of different sizes, with their interstices filled with earth easily loosened and washed away; it is a mound whose solid parts are cemented

together by a soft earth, and as the descents are rapid, the rains gradually loosen its foundations, and the fall of large masses of stone occasions a species of avalanche, which occasionally last several hours. Hence the volume or pressure of the lake would be assisted greatly in its operation. Their first efforts may be traced in the *gaps*, whose sides, near the summit of the ridge, exhibit those notches occasioned by the first overflowings of the lake, and which were afterwards deserted for wider and more commodious passages. It is easy to conceive that the rushing out of these waters would change the whole face of the lower country. Then were brought down all those particles which constitute the present surface. The banks of *talc* would easily be broken down, and the inner swamps drained, while their accumulations would be added to those of the shores. The latter are found, at this day, buried beneath the substance deposited by the great rivers.

In the vale formed by the Blue Ridge and the North Mountain, the changes correspond with the circumstances of this overflow. Several gaps, made at the same time or in succession, afforded passage to the rivers James, Potowmack, Susquehannah, Schuylkill, Delaware, and thus the great interior lake was divided into many smaller ones, by those heights or ridges which rose above the level of the bottom of the primitive gaps. Each of these lakes made itself, in time, an opening, which being gradually worn deeper and deeper, the whole basin was finally

drained dry. This operation was subsequent to the formation of the rivers James, Susquehannah, and Delaware, because their *basins*, or the vallies which supply them, are of a greater elevation. The Potowmack must have been of later birth, because its bed is lower than the rest. It is worthy of the government of the United States, or of some learned association of its citizens, to take measures for having all these regions accurately surveyed, with a view to illustrate these curious points in the physical history of their country. From these surveys would result the strongest proof of what I have said, and much new light would be thrown upon the ancient revolutions of our globe.

I cannot determine how far eastward the Delaware then extended the reflux of its waters. It appears that its basin was bounded by the ridge which at present forms the left bank of the river, and which is an elongation of the Blue Ridge and the North Mountain. This basin was probably always distinct from that of the Hudson, which it is certain had its own peculiar valley or lake, whose boundary or bank was at the Highlands, above West Point.

On a comprehensive view, it will clearly appear, that the transverse ridge, called the Highlands, formerly shut up the waters of the Hudson, and thus raised them to a considerable height. When it is seen that the tide ascends this river to within ten miles of Albany, so low a level for so great an

extent, compared with the height of the circumjacent ridges, may incline us to believe, that the lake diffused itself as far as Fort Edward, and perhaps was connected with the Lakes George and Champlain. The fall of the Cohoez could not exist till after the disruption of the southern bank at West Point. The existence of this lake, by satisfactorily explaining the traces of subterranean vegetation, the marine petrifactions, the beds of schistus and clay, observed by Dr. Mitchill, justifies the inferences drawn by that learned and sagacious observer, as to the situation of the ancient waters.

The existence of these lakes explains the distribution of the banks of rivers into two corresponding terraces, which takes place in almost all the rivers of America, but particularly in those of the western country, such as the Tenessee, Kentucky, Kenhawah, and Ohio. An example of this may be taken from the figure of the last river, at Cincinnati or Fort Washington, the strata of whose banks are exhibited in the plate.

a a The bed of the river, when the waters are lowest, such as I saw them in the month of August, 1796.

b b The bank, almost vertical, formed of layers of sand, gravel, and soft earth, and worn away and undermined by the vernal floods. This bank is almost 50 feet high.

c c The first bank, 900 feet wide, also formed of gravel and smooth stones. The high waters rise to

this bank, and wash away more and more of the gravel and pebbles*.

d d Is a soft ascent, about thirty feet high, composed of different beds of gravel and of earth, full of fossil shells, and of *fluvial* substances. These are also found in the loose bank. The floods never overtop this bank.

e e A second bank, which extends to the foot of the lateral hills, and on which is seated the new town of Cincinnati. Such is the right bank of this river.

The left side has the same kind and number of banks, at similar levels. In other places, these banks show themselves only on one side, while the opposite margin is a steep precipice, on which the river has left no durable traces, and sometimes a plain so wide, that the eye can discover those traces at the foot of the distant hills.

On examining the arrangement and position of these layers or terraces, and the substance that composes them, we shall clearly perceive, that even their highest surface has been once overflowed, and even been the bed of the river, in the history of which three distinct periods may be traced.

At the first of these periods, the transverse ridges of the hills, as yet unpierced and unbroken, barred

* These banks, and all the slopes along the Ohio, abound with the stramoneum (stink-weed), which is said to have been brought hither accidentally from Virginia, among other seeds, and which have encreased so much, that there is no approaching any part of the bank, without being incommoded by its disagreeable odour.

up the river, and raised its waters to the level of the circumjacent summits. All the lower plains and vallies formed a great lake or swamp of stagnant water. In the lapse of ages, and the continual assaults of annual floods, breaches were effected at the weakest parts of this mound. At one of these rents or chasms the waters would, of course, collect their principal strength, and hollow out and enlarge the opening, till its bottom should sink much below the level of the lake within. This first process would form the first plain or upper bank *e e*, and the waters of the river or lake would flow over the mass *c c*, and its bank would consist of the mass *d d*.

During the second period, the waters subsided in this bed.

At the third period, the cataract was formed, by the stream growing more active and regular, and the present deeper and narrower channel was scooped out, leaving the present bank *c c* dry.

It is probable the Ohio was confined at more than one point between Pittsburg and the rapids at Louisville. When I descended the river from the Kenhawah, not entertaining my present notions on these subjects, I paid no critical attention to the transverse ridges which I met with. This deficiency, however, was amply supplied by the ridges I encountered towards Gallipolis, and as far as the Scioto. On my return from Vincennes, on the Wabash, I was first struck by the position of a ridge of hills, situated below *Silver Creek*, about five miles from the *rapids*.

This ridge, vaguely denominated, by the Canadians, *the Banks*, stretches from north to south, across the *basin* of the Ohio. It compels the stream to change its course from east to west, in search of an outlet, which presents itself at its conflux with the Salt River. It may be said to require the accession of that river, in order to force a way through the rampart before it. The rapid but smooth declivity of these *banks* may be descended in a quarter of an hour. Compared with other heights, their elevation may be stated at 400 feet. The summit is too thickly studded with trees to permit us to trace the lateral course of this chain with the eye. We may discover, however, that it stretches far to the north and south, and that it shuts up the entire basin of the Ohio.

Viewed from this summit, the general appearance of this vale tended strongly to confirm all my previous opinions respecting the existence of an ancient lake. Other circumstances likewise lent their aid to this conclusion; for from this ridge to the *White River*, eight miles from Vincennes, the whole surface is roughened by hills, frequently steep and lofty. They are high and precipitous near the Blue River, and on both sides of the White River. They take a course, in general, transverse to the Ohio.

On the other side, at Louisville, I have observed the Kentuckian bank of the river to be formed of similar ridges. There appears every where a cluster of ridges, rising in powerful opposition to the waters. Much lower down, the country becomes flat, and the

immense savannahs of the Wabash and Green River, which stretch themselves as far as the Mississippi, begin, and exclude every supposition of a rampart on this side*.

Another circumstance favourable to these opinions, is the rapidity with which the rivers of Kentucky flow near their mouths, and their tardy course near their sources, which is directly the reverse of what commonly happens in other parts of the world. We must hence conclude, that the upper bed of these rivers approaches to a plain, and that their lower channel is moulded into a declivity. This coincides exactly with the supposition of an ancient lake; for, when this supposed lake occupied the whole region at the foot of the Allegheny, its bottom, particularly near its margin, was too uniform and level to allow the motion of its waves to make any material alteration in the surface: but when the mound, which

* A settler in Tenessee informed me, that all the rivers in this country, which flowed immediately into the Mississippi, have these banks. He accounts for it by stating, that every year, in the month of May, the Mississippi has a rise of twenty-five feet, which occasions all its branches to overflow, and enlarge gradually their channels. This rise operates like a mound or dyke to these rivers, and strengthens, in this respect, the theory which I have applied to other cases. It may also be noted, that, on its eastern side, the Mississippi is confined by a ridge of high land, which seldom affords to its periodical diffusions a breadth of more than four or five miles; while, on the western side, when the waters surmount their immediate boundary, they spread themselves over a flat sixty miles in breadth.

maintained the tranquillity of this lake, was broken down, the torrents thereby occasioned would furrow up the bottom into hills and hollows, and when finally the current, collected and concentered in the vale of the Ohio, bore down its obstructions with augmented rapidity, this valley would be hollowed out into a deep channel, whose steep sides would accelerate the streams, and their course continues to this day more rapid than elsewhere.

Allowing, then, the Ohio to have once been dammed up, either by the ridge at Silver Creek, or by some contiguous eminence, a lake of vast extent would be formed, for from Pittsburg the declivity is so small, that the river, when the waters are low, does not move more than two miles an hour, which implies a descent of four inches per mile. Now the distance from Pittsburg to the rapids at Louisville, computing the turns of the river, does not exceed 590 miles*.

The difference of level, throughout this extent, is about 200 feet. The height of the *banks* may, for want of actual measurements, be safely conjectured to be 200 feet. It will appear that such a mound was sufficiently high to hold the waters which might extend to the neighbourhood of Pittsburg. This conjecture will acquire new force, when the reader recollects what I have already said, that the region

* Hutchins conjectures the distance to be 700 miles, but later measurements have been made with more accuracy and precision.

comprised between the Ohio and Lake Erie is a vast plain, whose uniform inclination is almost insensible, a fact which is supported by the following appearances :

1. The Ohio, in its annual inundations, before it reaches the level of the first bank, that is to say, before it rises to a height of fifty feet from its bottom, mounts up the great Miami to Greenville, a distance, northward, of 72 miles. Of this fact I was assured by the officers at Greenville, the head quarters of general Wayne, in 1794.

2. During the vernal floods, the north branch of the Great Miami mixes its waters with the southern branch of the *Miami of the Lake*. The carrying-place, or *portage*, of a league, which separates their heads, disappears beneath the flood, and we can pass in canoes from the Ohio to Lake Erie, as I myself witnessed in 1796.

3. At Loremier's Fort, or store, an eastern branch of the Wabash serves as a simple canal to connect the two Miamis; and the same Wabash, by a northern branch, communicates, above Fort Wayne, in the time of inundation, with the Miami of Lake Erie.

4. In the winter of 1792-3, two boats *(periagas)* were detached from Detroit, by a mercantile house, from whom I received the information, which passed, without interruption, from the Huron river, which enters Lake Erie, into *Grand River*, which falls into Lake Michigan, by means of the rise at the heads of the two streams.

5. The Muskingum, which flows into the Ohio, communicates, at its sources, through some small lakes, with the Cayahoga, belonging to Lake Erie.

The inference from these facts is, that the land lying between the Ohio and the lakes never exceeds the elevation of a hundred feet above the first bank of the river, nor of seventy feet above the second; which is the general level of the country. Consequently a mound only two hundred feet high, placed at Silver Creek, would suffice, not only to spread out the waters towards Lake Erie, but to extend them from the rampart of the Allegheny to the north of Lake Superior.

In fine, the existence of stagnant waters in the western regions, such as I have traced between the Blue Ridge and the North Mountain, is no less evident to every observer of the scene. And this fact clearly and simply explains a great number of local appearances, which, in return, reflect new light upon the theory. These ancient lakes, for example, account for the levelling of the earth throughout the western country in horizontal strata; why these strata lie underneath each other in the order of their specific gravities; why, in so many places, there appear the remains of trees and other vegetables, and even of animals, such as the bones of the mammoth, found at a place called *Big-bones*, as well as elsewhere, thirty-six miles above the mouth of the Kentucky river, and which could only have been thus collected by the action of the waters. In fine, a

happy and natural explanation is thus afforded to the formation of those mines of coal, which predominate in certain situations and districts.

The delving of the numerous inhabitants, for twenty years together, has ascertained, that the country above Pittsburg, comprised between Laurel Hill and the upper branches of the Allegheny and Monongahela rivers, is a mass of coal, from twelve to sixteen feet in depth. This stratum lies upon a horizontal bed of calcareous matter, and has a superstratum of schist and slate. Its undulations conform to those of the strata above and below it, on the hills and in the vallies. It is of greater thickness on the hills, and less in the vallies, and in general its thickness is six or seven feet. Considering its location, we shall perceive that it chiefly prevails in the lower basin of these two rivers, and their branches the Yoghogheny and Kiskimenitas, all which tend, on a gently inclined plain, towards the Ohio, near Pittsburg. Supposing the existence of this great lake, the end of this lake may be fixed at this spot, and the utmost verge of stagnant waters.

Fossil or pit coal is well known to be formed out of fallen trees, gradually clogged and covered up by earthy particles, brought down by rivers and torrents. These vegetable heaps are not formed in the channel of the current, but in spots somewhat removed from it, where their position is left to be regulated by their own weight. This order of things is still manifest in many rivers of the United States, but especially in

the Mississippi, which annually carries away an immense number of trees. Some of these are left in the bays and inlets which the inundations enter, but the greater number stop not till they reach the sea shore. Here the river and ocean waters meet, and occasion a stagnation or sluggish motion in the former, and the trees gradually become fixed and motionless, till overwhelmed and buried in the mud and sand.

In ancient times, the rivers flowing from the Allegheny and Laurel Ridges, into the vale or *basin* of the Ohio, mixed, near Pittsburg, with the stagnant waters, at the verge of the great lake, and there deposited the trees, which the wintry and vernal torrents had uprooted and hurled down by thousands from the upper regions. These trees subsided into masses as level as the waters which transported them hither; and as the mound of the lake was successively extended, the lake receded step by step. By this operation, the vegetable depositions were gradually extended in the same line, and ultimately formed that vast layer, which, in process of time, was covered with mud, sand, and gravel, and assumed its present appearance.

Pit coal is found in many other parts of the United States, and always in circumstances similar to those above-described.

Evans speaks of a mine near the Muskingum, opposite the mouth of Laminskicola creek, which took fire in 1748, and burnt for a whole year. This mine

was produced by the process just described; and the great rivers entering the Ohio would almost all of them make depositions of this kind, in flat parts of their course, and in the adjacent districts.

The upper branch of the Potowmack, above and to the left of Fort Cumberland, is famous for its mines of coal, pervading the downs near its borders, in such a manner that boats may be loaded with this substance, while lying at the foot of the bank. Now this spot bears every appearance of a lake, formed by some of the ridges, which may be supposed to have once dammed up the Potowmack, above and below Fort Cumberland.

In Virginia, the bed of James River, ten miles above the rapids at Richmond, is formed by an extensive stratum of coal. In a few places, where wells have been sunk on the left bank, there has been found, under a mass of red clay, 120 feet thick, a stratum of coal, 24 feet thick, in a bed of inclined granite. It is evident, that the *rapids* below, which is still a considerable obstruction to the stream, was once an unbroken mound, and occasioned in this place a swamp, or, more probably, a lake. Wherever rapids are found, there is a check or stagnation in the stream immediately above. Here the floating trees would be liable to entangle and fix themselves. When the river had made itself a passage, and its level become lower, the floods of every year would accumulate, and make new additions to this mass of red clay, whose distant origin is clearly proved, by the resem-

blance it bears to the soil of the South-west Mountain, and the upper vallies of this river.

It is not impossible, however, that beds of coal may exist in the maritime country, whose formation cannot be explained in this manner, but a few instances of this nature ought not to overturn my general conclusions, because the whole country between the sea and the Allegheny has been broken up by earthquakes, the traces of which are every where visible, and these commotions have disturbed the regular horizontal order of the earthy and mineral strata, throughout its whole extent, from the St. Laurence to the Gulph of Mexico.

Having thus unfolded the state of the soil of the United States, it remains for me to speak of the most remarkable circumstances in its physical condition, and that which forms it grand distinction, since nothing like it is to be found in the rest of the globe: I mean the fall of the river St. Laurence, at Niagara.

CHAPTER III.

Of the Cataract of Niagara, and other remarkable Falls.

SOME late travellers* have considerably elucidated this surprising physical phenomenon; but as they have chiefly dwelt upon its influence, as a spectacle, upon the eye, and paid little or no attention to its topographical circumstances, of which the spectacle is merely an effect, I shall confine myself principally to the consideration of it in the latter view, in which it is by no means unworthy of attention.

It is surely a wonderful fact in geography, that a river, very near 2500 feet wide, and generally fifteen in depth, should find the level of its channel suddenly sink beneath its stream, and should throw down its entire mass of water, from a height of a hundred and

* Travels in the United States of America, by La Rochefoucault Liancourt, vol. II, and Travels in Upper Canada, by Weld, vol. II, which two works may be deemed a kind of portable library of the United States.—V. The former of these works abounds with the grossest errors.—TRANS.

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Section of Niagara at the Middle of the Stream

C. Tiebout Sc.

Course of the St. Lawrence at Niagara

forty-four feet, into a channel through which it pursues its subsequent course, where the spectator can discover no hill or ridge that could once have restrained or blocked up its passage. One cannot, at first, conceive by what position or direction of the surface nature has led to the production of this astonishing scene; but, when the process is discovered, we are equally astonished at the obvious simplicity of the means, and the grandeur of the end effected by them.

To enable the reader more clearly and distinctly to conceive this picture, we must remind him, that the country between Lake Erie and the Ohio is a vast plain, higher, in its general level, than almost all the rest of the continent, as is proved by the course of its rivers, some of which flow into the north Atlantic, and others into the Gulph of Mexico.

From the west and north-west sides, this plain proceeds, without interruption, from the savannahs bordering the Mississippi and the lakes. Southward and eastward, it touches the great rampart of the Allegheny; but on the northern side, having skirted Lake Erie, and approached within six or seven miles of Ontario, the level of this plain is suddenly lowered, and a new plain commences at the foot of the declivity, more than 230 feet below the former one, which forms the verge or table of Lake Ontario. In receding from the shore of the lake, we distinctly and easily perceive this change of level (see plate III, fig. 2, lett. *a*, *a*, *A*). At a distance, viewed from the lake, it ap-

pears like a lofty rampart (*a*), whose side is bristled with forests, and which seems to interdict all passage beyond it. If we enter the St. Laurence, and ascend as far as Queenstown (*b*), we presently perceive a deep and narrow chasm (*c*), from which flows the river, in a swift but unruffled course. The cataract still remains unexplained. This precipice stretches from Toronto, or even from a greater distance, and skirting the northern shore of Lake Ontario, at an interval of one or two miles, it makes a bend towards the east, on the southern shore of the lake, and crosses the river seven miles from its mouth, and the Genessee river at eight: afterwards it bends southward, and by a line five or six miles distant, west of the Seneca Lake, where I discovered its declivity*, it hastens to join itself with those branches of the Allegheny, from whence this lake receives its principal waters.

We may add to these particulars, that the plain, here nearly level with the mountains, extends itself, with them, to the Hudson river, where it terminates abruptly, as at Niagara, in a steep and lofty precipice,

* A mile and a half from Geneva, coming from Canandarqua, I found myself at the skirt of an amphitheatre, of a gentler and longer descent than that which I am going to describe, but affording a nobler prospect, for it presents to the single glance an immense flat table, on which is seen, north-west, Lake Ontario, and, on the east, a boundless extent of forest, speckled, here and there, by a few farms and villages, and the glistening surfaces of the Iroquois lakes.

and presents another topographical prodigy, in a surface which the tide pervades for a hundred and sixty-six miles, along the very foot of a loftier surface, from which other rivers proceed, such as the Delaware, in a course of four hundred miles.

The true mechanism of Niagara will not be so easily comprehended by those who approach it on the side of Lake Erie, in which direction I approached it, October 24th, 1796. From the lake, we have no mountain in view, except near Presque Isle, where some faint and remote ridges are seen, in the north-west quarter of Pennsylvania. The country traversed by the St. Laurence is a scene of continual forest, and the sluggish motion of the stream, scarcely at the rate of three miles an hour, affords no token of the direful commotion lower down. It is not till we reach the mouth of Chippeway creek, eighteen miles below Lake Erie, that the water assumes a quicker motion, and compels the boats to seek the shore, at a village built at this spot. Here the river expands into a sheet of water near two thousand feet wide, overshadowed on all sides by woods. Two miles and a half further is the fall (*e*). Our attention is at first awakened by a dull and rumbling sound, like the roar of a remote sea. This sound is lower or higher, according to the direction of the wind, but the eye as yet discovers nothing extraordinary. From hence we pursue our way, on foot, through a rugged waggon road, on the left bank of the river, while the trees shut us out from all the scene before us. Hav-

ing proceeded a mile, we perceive the river growing turbid and tumultuous, and, in another mile, it is entangled among rocks, which are covered with foam. Beyond these breakers, we behold issuing, as it were, from a chasm in the forest, a cloud of vapour, and this is the only token, as yet, of the river. The noise becomes now more violent, but the cataract is still unseen. We continue to proceed along the bank, which at first did not exceed the height of ten or twelve feet above the water, but which soon becomes twenty, thirty, and even fifty feet high, by which we may judge of the declivity thus far in the channel of the river*. Some hollows oblige us here to make a circuit from the river bank, which we presently reach again, by crossing some newly enclosed fields, and emerging at length from the trees and bushes, we find ourselves along side of the cataract. We here behold the river fall in one sheet, twelve hundred feet wide, into a hollow or canal worn by the force of its waters, from a perpendicular height of about two hundred feet. It is hemmed in by two rocky walls, whose tops are crowned with firs, oaks, cedars, &c. The traveller usually surveys the fall from a spot where a jutting rock (*i*) towers above the abyss. Some of my companions gave this spot the preference. Some others, whom I joined, were told

* The settlers have already made use of this descent, and consequent rapidity of the stream, by the erection of grist and saw mills (*h h*).

that the descent to the bottom of the gulph, more than half a mile below, was practicable, by means of Simcoe's ladder, and thought we should enjoy the scene more completely, as objects of this kind are viewed most advantageously looking upward to them. We accordingly descended, not without difficulty, by a kind of stairs, which are nothing more than the trunks of trees, disposed conveniently, with notches cut in them, on the face of the declivity. Having reached the bottom, we re-ascended towards the fall by a ledge of broken rocks mixed with sand, where lay the bones and reliques of deer and other animals, who, in attempting to pass the stream above, had been borne down by its rapidity.

The current near us was extremely rapid, on a stony bed, but unaccompanied with danger. Upon our left, before us, was a portion of the fall, about two hundred feet wide. A small isle divides this from the great cataract. Beyond, and in front of the spectator, this fall moulds itself into the form of a horse-shoe, with an opening of about twelve hundred feet, shrouded on the right by rocks jutting out from the side of the chasm. For more than eighteen hundred feet round the spray fills the air, and descending in columns, wets the spectator to the skin. Having just recovered from a malignant fever, which I contracted at Detroit, I had neither the power nor inclination to proceed any further. Some of my companions undertook to reach the foot of the cataract, but they were soon checked by obstacles much more

formidable than they had imagined. An English traveller, Mr. Weld, with whom I had sailed upon Lake Erie, had been more fortunate than we. Conducted by excellent guides, and profiting by leisure and means which we wanted, he proceeded as far as it was possible to do so, without certainty of perishing, and to satisfy my reader's curiosity, I shall extract his description of the scene.

" From the foot of Simcoe's laddder you may walk along the strand for some distance, without inconvenience, but as you approach the Horse-shoe Fall, the way becomes more and more rugged. In some places, where the cliff has crumbled down, huge mounds of earth, rocks, and trees, reaching to the water's edge, oppose your course; it seems impossible to pass them; and, indeed, without a guide, a stranger would never find his way to the opposite side; for to get there it is necessary to mount nearly to their top, and then to crawl on your hands and knees through long dark holes, where passages are left open between the torn up rocks and trees. After passing these mounds, you have to climb from rock to rock, close under the cliff, for there is but little space here between the cliff and the river, and these rocks are so slippery, owing to the continual moisture from the spray, which descends very heavily, that, without the utmost precaution, it is scarcely possible to escape a fall. At a distance of a quarter of a mile from the Great Fall, we were as wet, owing to the spray, as if each of us had been thrown into the river.

" There is nothing whatsoever to prevent you from passing to the very foot of the Great Fall; and you might even proceed behind the prodigious sheet of water that comes pouring down from the top of the precipice, for the water falls from the edge of a projecting rock; and, moreover, caverns, of a very considerable size, have been hollowed out of the rocks at the bottom of the precipice, owing to the violent ebullition of the water, which extend some way underneath the bed of the upper part of the river. I advanced within about six yards of the edge of the sheet of water, just far enough to peep into the caverns behind it; but here my breath was nearly taken away, by the violent whirlwind that always rages at the bottom of the cataract, occasioned by the concussion of such a vast body of water against the rocks. I confess I had no inclination, at the time, to go farther; nor, indeed, any of us afterwards attempted to explore the dreary confines of these caverns, where death seemed to await him that should be daring enough to enter their threatening jaws. No words can convey an adequate idea of the awful grandeur of the scene at this place. Your senses are appalled by the sight of the immense body of water that comes pouring down so closely to you from the top of the stupendous precipice, and by the thundering sound of the billows dashing against the rocky sides of the caverns below; you tremble with reverential fear, when you consider that a blast of the whirlwind might sweep you from off the slippery rocks on which

you stand, and precipitate you into the dreadful gulph beneath, from whence all the power of man could not extricate you; you feel what an insignificant being you are in the creation, and your mind is forcibly impressed with an awful idea of the power of that mighty Being, who commanded the waters to flow.

" Since the falls of Niagara were first discovered, they have receded very considerably, owing to the disrupture of the rocks which form the precipice. The rocks at bottom are first loosened by the constant action of the water upon them; they are afterwards carried away; and those at top being thus undermined, are soon broken, by the weight of the water rushing over them: even within the memory of many of the present inhabitants of the country, the falls have receded several yards. The commodore of the king's vessels on Lake Erie, who had been employed on that lake for upwards of thirty years, informed me, that, when he first came into the country, it was a common practice for young men to go to the island in the middle of the falls; that after dining there, they used frequently to dare each other to walk into the river, towards certain large rocks in the midst of the rapids, not far from the edge of the falls, and sometimes to proceed through the water, even beyond these rocks. No such rocks are to be seen at present; and were a man to advance two yards into the river from the island, he would be inevitably swept away by the torrent. It has been conjectured,

as I before mentioned, that the falls of Niagara were originally situated at Queenstown; and, indeed, the more pains you take to examine the course of the river, from the present falls downward, the more reason is there to imagine that such a conjecture is well founded. From the precipice nearly down to Queenstown, the bed of the river is strewed with large rocks, and the banks are broken and rugged; circumstances which plainly denote that some great disruption has taken place along this part of the river; and we need be at no loss to account for it, as there are evident marks of the action of water upon the sides of the banks, and considerably above their present bases. Now the river has never been known to rise near these marks, during the greatest floods; it is plain, therefore, that its bed must have been once much more elevated than it is at present. Below Queenstown, however, there are no traces on the banks to lead us to imagine that the level of the water was ever much higher there than it is now. The sudden increase of the depth of the river, just below the hills at Queenstown, and its sudden expansion there, at the same time, seem to indicate that the waters must, for a great length of time, have fallen from the top of the hills, and thus have formed that extensive deep basin below the village. In the river, a mile or two above Queenstown, there is a tremendous whirlpool, owing to a deep hole in the bed. This hole was probably also formed by the waters falling, for a great length of time, on the same spot,

in consequence of the rocks which composed the then precipice having remained firmer than those at any other place did. Tradition tells us, that the Great Fall, instead of having been in the form of a horse-shoe, once projected in the middle. For a century past, however, it has remained nearly in the present form; and as the ebullition of the water, at the bottom of the cataract, is so much greater at the centre of this fall than in any other part, and as the water consequently acts with more force there, in undermining the precipice, than at any other part, it is not unlikely that it may remain nearly in the same form, for ages to come.

"At the bottom of the Horse-shoe Fall is found a kind of white concrete substance, by the people of the country called spray. Some persons have supposed that it is formed by the earthy particles of the water, which descending, owing to their great specific gravity, quicker than the other particles, adhere to the rocks, and are there formed into a mass. This concrete substance has precisely the appearance of petrified froth; and it is remarkable, that it is found adhering to those rocks, against which the greatest quantities of the froth that floats upon the water is washed by the eddies.

"We did not think of ascending the cliff till the evening was far advanced, and had it been possible to have found our way up in the dark, I verily believe we should have remained at the bottom of it until midnight. Just as we left the foot of the Great

Fall, the sun broke through the clouds, and one of the most beautiful and perfect rainbows that ever I beheld was exhibited in the spray that arose from the fall. It is only at evening and morning that the rainbow is seen in perfection; for the banks of the river, and the steep precipice, shade the sun from the spray at the bottom of the fall, in the middle of the day."

It remains for me to explain how the river extricates itself from the chasm. I pursued my way on foot, across the wood, by a steep path, for six miles. I was endeavouring to discover the outlet, when I suddenly lighted on the steep shelf before described. The Canadians denominate this place the *platon*, or platform. My view, here disembarrassed from the trees, suddenly glanced over a boundless horizon. On the north, Ontario stretched itself before me, like a sea; nearer lay an extensive meadow, through which the St. Laurence flows, in three sweeps or bends. Beneath me, and, as it were, at the bottom of a valley, the little village of Queenstown is seated, on the west bank of the river; while, on the right, the river finally issues as from a cavern, by an opening concealed by the woods from my view.

To those, who closely examine the situation of the scene, it is plain, that the fall commences here, and that it has sawed through the layers of the rock, and thus hollowed out its channel. The chasm has been gradually worn away, from age to age, till it reached the place where the fall now appears. This operation has continued slowly, but incessantly. The

oldest settlers in the neighbourhood, as Weld relates, recollect a period when the bank of the fall was several paces forward. An English officer, stationed for thirty years at Fort Erie, states several facts, clearly proving, that the rocks existing there thirty years ago, are now undermined.

In the winter of 1797-8, the great thaw, and consequent floods, loosened great masses, which confined the course of the water. If the European colonists or travellers, to whom this region has been accessible for a century and a half, had made careful memorandums, from time to time, of the state of the fall, we should, by this time, have been able to trace the progress of those revolutions, which are easily proved to have taken place, by vestiges and indications which present themselves at every step*.

During five days which I passed with judge Powel, who has made a settlement five miles from *Platon*, I had an opportunity of revisiting the *ravine*, at a spot where a large bay is formed in one of its sides (*k*). Here the waters have formed a deep recess or whirlpool, in which are entangled all the floating bodies, which cannot go any further. We observe, at this

* It is extremely desirable that the government of the United States, at present under the direction of a friend to the arts and sciences, should order to be drawn up an exact description of the present state of the cataract. This statement, compared with subsequent appearances, observed from time to time, would enable us to trace with certainty the changes that may hereafter take place.

place, the river, checked by the stubborn rock, carries its fall over several points, and appears to search out the weakest spot, through which it continues its way.

The fall at Niagara is undoubtedly the greatest of the American cataracts, but there are many others deserving the attention of philosophers, some on account of their volume, and others on account of their height.

The continuation of the same ridge which forms the Niagara falls, on the southern side of Ontario, occasions two or three falls in the Genessee river, which, taken together, are equal to Niagara, and which prove that this bank or ridge preserves pretty much the same level. I say *two* or *three*, because travellers differ among themselves as to the number, and not having explored them myself, I cannot settle the dispute. Mr. Arrowsmith distinguishes only two, of which, that nearest the lake is seventy-five feet high, and the other ninety-six, which added together make a hundred and seventy-one.

Pouchot, a French officer in Canada, during the Canadian war, enumerates three falls, the first of which is sixty feet high, the second somewhat higher, and the third a hundred feet in height, which in all are a hundred and sixty feet French. And this total, the English foot being to the French nearly as fourteen is to thirteen, sufficiently agrees with the numbers of Arrowsmith, whose authorities appear to have overlooked the second cascade of Pouchot.

Bougainville, the famous circumnavigator, who served likewise in the Canadian wars, estimates the second fall, in a manuscript account which he has shown to me, at 20 feet. This will give a total height of 180 feet. Now if Niagara be reckoned at 144, and for the declivity preceding it about 50 feet English, which is near 46 French, the total will be 190 French, which differs only 10 feet from Bougainville's estimate*. Below Quebec, on the north side of the St. Laurence, a river of secondary magnitude forms a celebrated fall, called the falls of Montmorenci. A sheet of water, from 46 to 50 feet wide, falls from a height of 220 feet, and forms a very picturesque appearance in the snowy flakes which are occasioned by so long a descent.

Above Quebec, on the southern side, another river, called La Chaudiere, has a fall, not above half the height of the preceding ones, but its breadth is from 225 to 230, of which Mr. Weld has given us a description. A third fall, called the Cohoez, is that of the Mohawk, three miles before it enters the Hudson.

* An anonymous, but apparently authentic writer in the American Museum (vol. 8, p. 215), states the elevations at Niagara thus:

1. Height of the rapids - -	58 Feet
2. ——— of the fall - - -	157
3. ——— of the hollow, or channel, to *Platon*, seven miles -	67
	282

This name, Cohoez, appears to be an imitative sound, borrowed from the Indians; and it is very remarkable, that the same name is bestowed upon a small cascade, nine miles from Spa. The Cohoez is reckoned by some to be 60 feet high, by others only 50 feet. The falling stream is about 800 feet wide. It is roughened by numerous rocky points.

The fourth great fall is that of the Potowmack, six miles above Georgetown. It has a height of 72 feet, and a breadth of 8 or 900. The river, whose upward course is through a valley, whose sides are wild as those of the Rhone in the Vivarais, falls in one mass, like the St. Laurence, into a hollow of pure rock of micaceous granite, cut down into a sharp wedge-like form. It frees itself a passage, some miles lower down, by the spreading of the valley in the lower country.

We might enumerate many other falls, more remarkable for their height than the volume of the stream. Such is Falling Spring, on one of the upper branches of James River. Mr. Jefferson, in his Notes on Virginia, estimates its height at 200 feet English, but its breadth is only 15 feet.

The fall of the Passaic, in New Jersey, is from 66 to 70 feet high, and 100 wide. With respect to what are called the Falls of St. Anthony, on the Mississippi, above the river St. Pierre, I shall only copy Mr. Arrowsmith, who states the height at 29 feet.

To these grand phenomena of nature, Europe offers nothing worthy of comparison, except the fall

of Terni, in Italy, and the cataract of the Rhine at Shaffhausen, whose descent, according to Mr. Coxe, is from 70 to 80 feet. The stream is broken by large rocky projections, and, in this respect, as well as in its height, suggests a comparison with the fall of Potowmack. As to Terni, it is higher than them all, having a deseent of no less than 700 feet, but the stream is very inconsiderable.

The cascades, abounding among the Alps, Appenines, and Pyrennees, do not deserve mention. The cataracts of the Nile, anciently so much celebrated, have been lately thoroughly explored, and found to be no more than rapids, falling over ledges of granite, about a foot in height when the waters are low, and thus we have a new instance of the exaggerating spirit of the Greeks, and of their imperfect knowledge in natural history and geography.

CHAPTER IV.

Of Earthquakes and Volcanoes.

THOUGH North America has only been known about two centuries, this period, so brief in the annals of nature, has supplied us with numerous proofs, that earthquakes have been violent and frequent throughout this region, in former ages, and that they have occasioned those subversions, of which the maritime country affords continual and striking indications. If we ascend merely to the year 1628, when the first English colonists arrived, and deduce events down to 1782, a course of 154 years, says Mr. Williams, we shall find mention made of forty-five earthquakes. His enquiries have established the following general facts:

" That these earthquakes are denoted by a noise, resembling that of a high wind, or that sound which is produced by a chimney on fire. That they throw down the chimney tops, and sometimes even houses themselves; that they have made doors and windows

rattle, and leave wells, and even many rivers dry; that they make the waters turbid, and give them a fetid smell of liver of sulphur; that they throw up sand from rents in the earth, which has the same odour; that their tremors appear to flow from internal fire, which pushes the earth upwards, in a line generally running from north-west to south-east, in the course of the Merrimack river, extending southward to the Potowmack, and north to the St. Laurence, particularly affecting the direction of Lake Ontario."

Some particulars in this writer's details have a striking agreement with the appearances which I have already enlarged upon. The odour of liver of sulphur (or ammoniacal sulphure), with which the water and sand are impregnated, exuding from the earth, in large crevices or rifts, is supplied by the strata of schistus, which we see, under a calcareous superstratum, at Niagara, and which, when exposed to the heat, exhales a strong sulphureous vapour.

This schistous stratum is found in the channel of the Hudson, and appears, in many places, in Pennsylvania and New York, among sand stone and granite. There is reason to believe that it prevails all round Ontario, and under Lake Erie, and consequently that it forms one of the great layers of the country, where earthquakes have their principal focus.

The line of this subterranean fire runs north-west and south-east, affecting strongly the direction of the sea and the Lake Ontario. This bias or tendency is the more remarkable, considering the singular

structure of the lake. The other lakes, notwithstanding their great extent, have no great depth. Erie is never more than 100 or 120 feet deep. Lake Superior is easily fathomed, in several places. Ontario, on the contrary, is, in general, very deep, exceeding 250 feet, and, in many places, sounded ineffectually with a line of 500 feet. This vast depth is sometimes discovered near the shore. From these circumstances, the inference is clear, that the bed of the lake is the crater of an extinguished volcano. This conclusion is strengthened by the many volcanic substances found upon its shores, and of which skilful eyes would, no doubt, discover many other specimens; by the shape of the great ledge or cliff which forms an almost circular border to the lake, and which every where evinces, to reflecting observers, that the *flat* of Niagara once extended to the midst of this lake, and that it has been broken up and engulphed by the action of a volcano.

The existence of this furnace agrees with all the traces of earthquakes hitherto mentioned; and these two agents, which we here find united, prove at once the existence of subterranean fires, at a great but unknown depth beneath the surface, and explain that confusion in which the strata of the Atlantic or maritime region is at present found. It likewise explains why the calcareous, and even the granitic strata, have so great an inclination as between 45 and 80 degrees, their shattered masses being heaped together in the pits or chasms formed by great explosions. It is to this

breach in the bed of isinglass that the little cataracts are owing; and this fact shows us, that this secret combustion extended, beyond the Potowmack, as far south as this bank itself.

There is doubtless some communication between this bank of talc and that of the Antilles.

I have already observed, that no trace of earthquakes is to be found in the western country; that the Indian languages contain no word corresponding with this phenomenon: I may add, from the authority of Dr. Barton, that they no longer have in use a name equivalent to volcano, of which they can perceive no vestiges amidst the lake, but of which there are numerous remains on the Allegheny. I was informed, at Detroit, that the northern Indians relate a story of a mountain, somewhere far inland, which sometimes throws out smoke; but the report wants a surer foundation.

We may reasonably hope, that, in process of time, learned associations may take place, in the United States, who may employ, in geological investigation, more steadfast and experienced means, and thus make greater discoveries, than it is possible for single travellers to accomplish.

Such investigations cannot fail to furnish new and valuable materials for the history of the globe, and will tend to confirm the conjecture of some naturalists, which I have likewise adopted, that North America has emerged from the sea, at a later period than South America, or the greater part of the eastern

continent. These waters, whether fresh or saline, fluvial or marine, once covered the surface of this globe, to a greater height than that of the most elevated ridges, and for so long a time as to dissolve all these matters, which were crystallized after their evaporation or subsiding.

I shall now proceed to some details respecting the climate of this country.

CHAPTER V.

Of the Climate.

BY climate, strictly taken, we ought to understand nothing more than the degree of latitude, but as the heats or colds of a country have some connection with the degree of its latitude, we have now connected with this term the customary temperature of the atmosphere. Yet it is not strictly true, that the temperature of a country is necessarily regulated by the latitude. On the contrary, it seems to be modified by, and sometimes wholly to depend upon, various circumstances of the surface. Thus, this temperature is materially affected by the scarcity or prevalence of trees or of water, by the height of its general level above the sea, by the quarter to which its slopes are turned, and, above all, by the kind, force, and direction of those streams of air called winds. Hence it follows, that the condition of the surface essentially influences the temperature or climate. This truth will receive powerful confirmation,

from the details into which I shall now enter of the aerial phenomena of the United States.

1. The climate of the maritime region is colder in winter, and warmer in summer, that that of the countries of Europe under the same parallels.

The historians of America and naturalists have long ago noticed with surprise, that the climate of the sea coast was, by many degrees, colder in winter than the parallel regions in Europe, and even in Asia and Africa, adjacent to the Mediterranean; but they seem to have overlooked a circumstance equally remarkable, which is, that the heat of summer is, in like manner, greater by many degrees, than that of the eastern hemisphere. I shall give particular examples of both these peculiarities. In the northern parts of New England, between 42° and 43°, by observations made at Salem, near Boston, during seven years, by Mr. Edward Holyoke,*, and compared with twenty years of observation made at Manheim†, it appears, that the temperature of Salem is higher in summer and lower in winter than that of many cities of Europe. The difference will appear in the following table.

	Lat.	Lowest	Highest	Var.
Rome	41° 53′	32	86	54
Marseilles	43° 17′	23	$88\frac{1}{4}$	$65\frac{1}{4}$
Padua	45° 22′	$9\frac{1}{2}$	$97\frac{1}{4}$	$87\frac{3}{4}$
Salem	42° 35′	12 below 0	$102\frac{3}{4}$	$114\frac{3}{4}$

* Transactions of the American Philosophical Society, vol. I.

† Ephemerides Meteorologicæ Palatinæ Manheim.

We may observe, in this table, the difference throughout the year is 114$\frac{3}{4}$ degrees, while this difference at Rome is only 54 degrees, at Marseilles 65, and at Padua 87.

Generally in Maine, Vermont, New Hampshire, and Massachusetts, countries situated between 22° and 45°, parallels corresponding with the south of France, and the north of Spain, the earth is covered, every winter, with snow for three or four months, so as to make the use of sleds and sleighs universal. The thermometer, generally, in winter, between 32 and 10 degrees, sometimes descends so low as 5, 1, and even 8 below 0. Mr. Belknap, the historian of New Hampshire, has observed it, at Portsmouth, north of Salem, at 18 degrees below 0, and S. Williams, the historian of Vermont, at 26 degrees below 0, at Rutland, at the foot of the Green Mountains.

A little farther north, namely, in Canada, at 46° and and 47° latitude, which corresponds with the middle of France, the snow begins to fall in November, and continues on the ground till the end of April, a period of six months, from four to six feet deep, with a clear and dry air. At Quebec, the mercury usually descends to 13 and 22 degrees below 0; nay, the mercury was known, in 1790, to freeze*, which implies a still greater descent. Now such an instance seldom or never occurs in Europe, in latitudes be-

* Liancourt's Travels, vol. II, p. 207.

low that of Stockholm and Petersburg, which are situated at 60°*.

This low temperature in winter gives rise to some curious appearances, as to the expansive force of water in freezing.

Major Edward Williams tried the following experiment at Quebec: He filled iron bombs with water. He closed the orifice with a tompion, driven close, and then exposed them to the action of the air.

If the bomb had any cracks or defects, it burst at the instant of congelation, and the enclosed ice shot out small masses from its general surface, like wings or fins; but when the bomb was sound, the wooden stopper was ejected, with a loud report, and to the distance of from 60 to 415 feet, though weighing two pounds and a half, and was found with a match or fusee of ice fixed in it, six or seven inches long. From these facts he infers, that water, in congealing, dilates itself in the ratio of one seventeenth or one eighteenth of its proper bulk.

At Montreal, above Quebec, the snows are of shorter duration, by two months, than lower down the river; and further upward, at Niagara, they are shorter than at Montreal, by an equal portion of time. This is exactly contrary to appearances elsewhere

* The mean cold at Petersburg, for twenty years, from 1772 to 1792, according to the reports of the Russian Academy of Sciences, was at 23 degrees below 0, but the greatest cold is not mentioned. The ice is formed 25th September, and melts 25th April, as it does at Quebec.

along the coast, and will serve to confirm a theory to be hereafter explained.

In Maine, Vermont, and New Hampshire, the heats are equally intense, from their commencement at the summer solstice. For forty or fifty days together, the mercury is frequently observed to exceed 77 degrees, and sometimes rises to 86 and 90. Few years pass at Salem without its rising to 99 and 100 degrees, which is the temperature of the Persian Gulph and the coasts of Arabia. This temperature reigns in many other parts of New England. At Rutland, S. Williams has seen the mercury at 93 degrees. What is more surprising, at Quebec, and on the shores of Hudson's Bay, in the latitude of 59°, they suffer, for twenty or thirty days, a heat of from 95 to 99 degrees, which is the more injurious, as the constitution is unprepared for it, and since it is accompanied either by a dead calm, or by a warm, humid, suffocating wind from the south. Since the winter's cold is equal to 35 and 40, and even, at Prince of Wales's Fort, to 51 degrees below 0, it follows, that the annual variation is from 130 to 135 degrees of Fahrenheit.

In the middle states, which are those southward of New York, throughout Pennsylvania, New Jersey, and Maryland, the winters are shorter, and the snows less abundant and more transient. They rarely last longer than fifteen or twenty days, but the heats are not less fierce and violent. They become settled about the middle of June, and prevail, with little re-

mission, for six or seven weeks. Towards the end of October, they begin to decline.

At Philadelphia, in the latitude of 39° 55′, and corresponding, in this respect, with Madrid, Valencia, and Naples, the mercury sinks, every winter, to 14 and 9, and, in some seasons, to 5 and 1. For several days together, I have seen it 6 and 8 below 0. This cold is so intense, that the Delaware, notwithstanding its tide of six feet, and its breadth of a mile, is sometimes frozen over in twenty-four hours. It remains thus fixed *almost* every winter, for twenty, thirty, and sometimes forty days, at one or two intervals. There is generally, in the course of each season, two or three *breakings up*, which take place most commonly between the thirtieth and fortieth day after the solstice.

In the year 1788, on the 4th and 5th of February, the mercury sunk, in one night, from 27 to 4 below 0, and the river was frozen fast in the evening of next day. 1764, December 31st, between the hours of ten at night and eight in the morning, it froze sufficiently hard to bear passengers. In this sudden metamorphosis from liquid to solid, I have observed, says Dr. Rush, a fume or vapour rise from the surface, in so dense a column, that the people collected in admiring crowds to behold it.

At the summer solstice, and even for twenty days after it, the heats are so intense, at Philadelphia, that the streets are deserted from noon till five o'clock, and most of the inhabitants retire to repose after

dinner*. The thermometer often rises to 88 degrees. There are instances of its ascent to 95 and 99. In

* A native of that city will smile at this statement. The after-dinner nap, or *siesta*, is taken only by the old, infirm, or indolent, and not by a larger proportion of the people than in the north of Europe. At noon and an hour after, the streets are most busy and frequented, the only noticeable circumstance being that a few of the passengers have umbrellas, and the rest prefer the shaded side of the street. The truth is, that our manners do not accommodate themselves to the climate, either in winter or summer, but we follow, in most respects, the fashion of our ancestors, who came from the temperate atmosphere of Europe. Strangers, from the torrid zone, especially from the islands, complain exceedingly of the heats of Philadelphia, when the mercury reaches 85 degrees, though natives of that city read, write, or pursue their mechanical vocations, without sensible inconvenience, in a heat of from 86 to 89. The writer of this note has been sitting at his ease, in a spacious room, in an airy situation, surrounded by trees; at six o'clock, P. M., observing the noon-day heats remitted, he has looked at the glass, and found it 89 degrees. This happened several days together, during the present summer, 1804. He has often observed men working diligently in the field, in a heat of 87, and has himself walked five miles, in a dusty, shadeless road, at noon day, with a black beaver hat on his head, when the heat was 91, in the shade of an adjacent wood. Pennsylvania farmers frequently drive the plough and the wain, when the hand would be blistered by touching the iron work of these machines. At Lichfield, in Connecticut, at nine o'clock in a July morning, the writer's hand has literally been *burnt*, by laying it by chance on the tire of a cart-wheel, before a blacksmith's shop. These instances prove, at once, the great heats of the American climate, and the influence of constitution and bodily habit to enable the natives to support them. These principles operate beneficially, in spite of absurd modes in eating and dressing, and the

the course of the day, it will sometimes rise from 65 and 70 to 80 and 85, a variation of 15 and 20 degrees. What renders this heat particularly irksome, is the almost absolute repose of the air, particularly for three hours after noon, and the moisture that loads the atmosphere. From this detail it appears, that the compass of the annual variation is from 95 to 105 degrees.

Dr. Rush was the first who noticed the analogy subsisting between the climate of Pekin and that of Philadelphia; and a close examination will enable us to discover a striking similitude between the climate of North America and that of northern China and eastern Tartary.

In the southern states, Virginia, Carolina, and Georgia, the duration and intensity of the cold declines in the same proportion as the latitude. The parallel of Potowmack, or more exactly that of the Patapsco, forms, in this respect, a distinguishing line. The dominion of snow is bounded here, and he who travels southward may notice the *sleigh* before every farmer's door, till he descends the steeps, at the foot of which rolls the Patapsco, after which he will see that vehicle no more.

almost general disuse of the bath. Vast numbers pass through a long life, amidst all these heats, clothed in cloth, flannel, and black fur hats, and lying on a feather bed at night, drinking nothing but wine and porter, and eating strong meats three times a day, and never allowing water to touch any part of them but their extremities, for a year together.—Trans.

In the interior of the country, towards the Blue Ridge, the snows prevail somewhat beyond this limit, on account of the greater elevation of the surface. This quarter, nevertheless, is exposed to severe frosts, for forty days ensuing the winter solstice. At Norfolk, on the 4th February, 1798, there fell, in one night, five feet of snow. Even at Charleston, in the latitude of 30°, which answers to that of Morocco, the mercury sunk to 23 degrees, according to Liancourt, and the earth was frozen for a depth of two inches, in one night*.

Along the coast, below the Potowmack, from a month before the solstice, the heat is so violent, that, for four months together, the mercury rises, in the afternoon, notwithstanding the sea breeze, to 83 and 86 degrees. At Savannah, it reaches 102 and 106 degrees, a much higher temperature than is known in Egypt, where the medium is 88 degrees in the shade; and even this temperature is there moderated by a constant breeze, and a pure dry air. Henry Ellis observed the mercury, at Savannah, at 100 degrees. He complains that, for several nights together, it

* It is this which prevents the common growth of the orange; but it does not injure the olive, of which valuable product Mr. Jefferson has made a present to his country, especially if it be the Corsican olive, which, in 1792, I saw flourish, in spite of a temperature of 27 and 25 degrees, in the mountains of Corsica, which are 3000 feet above the sea. The Corsicans even affirm, that eight days of snow, a foot deep, destroys noxious insects, and insures its growth.

never sunk below 96. In his cellars it stood at 80*, and under his arm at 96 degrees. Dr. Ramsay, who made his observations at Charleston, has seen it rise to 95 degrees, only once in five years. But Charleston, situated at the mouth of a small river, shaken by the tide, enjoys the sea breeze, and passes for a cool place, among the people of the country, who make it their asylum in summer.

It follows that, in the southern states, the annual variation is from 70 to 75 degrees, and the reader has doubtless observed, that these variations decrease as we go southward. Thus it amounts to 135 degrees near Hudson's Bay, to 110 in Massachusetts, and to 100 in Pennsylvania. It sinks to 80 degrees in Carolina. Advancing nearer the tropics, the annual variation, in most places, exceeds not 45 and 50 degrees. At Martinique, Porto Rico, and other windward isles, the temperature, moderated by the sea breeze, mounts no higher than 95, nor sinks below 55, a difference of 40 degrees. On the ridge of hills, near Caraccas, at 10° north latitude, a height of more than 7000 feet above the sea, the mercury is stationary between 55 and 80 degrees. At Surinam, near the sea shore, it vibrates between 88 and 93 degrees. The traveller going from these latitudes northward, in summer, finds the heat oppressive and irksome, exactly in proportion to his progress in this direction; and as to myself, I greatly prefer the temperature of Cairo to

* See American Museum, vol. VIII.

that of Philadelphia. It is true, that, as we go towards the mountains, the heat, though still fervent, becomes more supportable, and as we approach their summits, we meet with an atmosphere lighter, purer, and more elastic. In general, however, in what are called the temperate zones, especially in low and humid regions, the temperature is more unpleasant than in what are called the *hot* countries. Within the limits of the *torrid zone*, the temperature is more equable than in the contiguous regions, and far more favourable to health, and to vital energy, if the air were less saturated with exhalations from animal and vegetable putrescence, and if strangers, especially those from Europe, did not carry with them their voracious attachment to gross meats and inflammatory liquors.

The English and American philosophers, according to the genius of their country, which is addicted to system, are accustomed to deduce, from these extremes of heat and cold, a mean term, which they set up as the standard of temperature. Having stated, for instance, as the extremes, at Salem, 10 degrees below 0 and 100 degrees, the intermediate degrees are 110, and taking the half, or 55, as the middle term, they suppose 45 degrees to be the standard or customary temperature of the country. They apply the same process to the variations of the same day, and if, as it often happens in the United States, there are 20, 30, or 40 degrees of variation in the twenty-four hours, they fix upon the medium between these

as the temperature of the day; but the truth is, this supposed temperature never takes place: the transitions are generally so quick, within the compass of the same day, that the middle term is imperceptibly passed over by the rising or sinking mercury; and even, in the course of a whole year, the temperature is seldom or never stationary at this middle point for more than a hundred hours. This arithmetical process is somewhat less erroneous, when employed in calculating the prevalence of winds, by the number of hours and days that each prevails; but when these tables are not compared with the state of the thermometer, during the prevalence of each wind, they fail to instruct us in a point of chief importance, which is, the connection between the direction of the wind and the temperature, the latter being chiefly, if not entirely, dependent on the former.

A better method of determining the general or medial temperature of a country is suggested by Mr. Williams, who proposes to take it from the temperature of the earth, as found in deep wells or caverns. In pursuance of this plan, he ascertained the temperature of wells at Rutland, in Vermont, at the depth of 45 feet, to be - - 44 deg.

In different places in Massachusetts,	49
At Philadelphia, - -	53
In Virginia, according to Jefferson,	57
At Charleston, according to Dr. Ramsay,	63

We here observe a gradation corresponding with the distance from the pole, which adds new force to

De Saussure, in opposition to experiments confuting the old opinion, that the mean temperature of the whole globe is 55 degrees, and proves that heat is proportioned to the action of the sun's rays on the surface of the earth.

3. The daily variations are greater and more abrupt in the maritime country than in Europe.

The great changes, incident to the atmosphere of the coast, display themselves not only in the compass of one season, but in that of a single month, week, and even day. This vicissitude particularly takes place in the middle states, and is greater in the flat than in the mountainous country. This, no doubt, happens from the situation of the middle states, between two adverse atmospheres, the polar and the tropical, becoming thus a scene of continual warfare between large masses of hot and cold air.

It seems, says Dr. Rush, as if our climate were a compound of all other climates in the world. We have the damps and glooms of Britain in the spring, the scorching rays of Africa in summer, the mild temperature of Italy in June, the cold and snow of Norway, and the ice of Holland, in the winter, somewhat of the storms of the West Indies at every season, and the capricious winds and fluctuating weather of Great Britain throughout the year.

In winter, especially in January and February, the temperature often varies fourteen, eighteen, and even twenty-eight degrees, in the course of eighteen hours, which has a pernicious influence on health. In

twenty-four hours, on the 4th and 5th of February, 1788, the mercury sunk from 37 to 4½ degrees below 0, a difference of 41½ degrees. Sometimes the south and east winds raise the temperature to 54 or 58 degrees, and brings on a sudden thaw*; and this temperature, continuing for some days, has been known to induce premature vegetation, and peach trees have been covered with blossoms in the middle of February: but April being the regular and customary limit of the cold weather, the wind never fails to return to the north-east and north-west quarters; the earth is bound again with frosts, and winter resumes his reign with as much severity as ever.

Similar vicissitudes take place in summer, and the intense heats of the day are usually succeeded by a night of piercing cold. It has been noted, that the higher the mercury rises in the afternoon, the lower it sinks at day-break the ensuing day, three o'clock, in the afternoon and morning, being the extremes of diurnal temperature. When, at mid-day, the glass has risen to 86, and even to 90 degrees, it has sometimes fallen, on the ensuing night, to 65 and 60. The descent from 80 degrees in the day time is usually to 68 at night; but from 60 it sinks only to 56. These changes are most apt to occur immediately after thunder storms, with or without rain. In the

* Thaws are sometimes so rapid, that the snow melts to the eye, and liquifies as fast as if hot water were poured upon it.—Trans.

summer of 1775, after a storm of rain and thunder, the mercury sunk 20 degrees, in an hour and a half. If we except July and August, there are very few evenings in the year on which fire would not prove agreeable*.

These changes are far less violent among the hills in western Pennsylvania. There the cold is more equable in winter, and the heat less intense in summer, and, in either case, the air is more pure, wholesome, and respirable, than in the lower country, where the atmosphere is moist and dense.

What Dr. Rush here says of Pennsylvania, is equally true of the southern part of New York, of New Jersey, and Maryland, and may also, in a considerable degree, be affirmed of the coast of Virginia and the Carolinas. In Charleston, variations of 18 and 22 degrees are often experienced, at all seasons, in the same day. This variation has sometimes amounted to 27 and 35 degrees, and Dr. Ramsay has recorded one revolution, in the course of less than fifteen hours, equal to 50 degrees. October 28th, 1793, the mercury sunk from 18 to 3 degrees, in twelve hours†.

Mr. Ellis tells us, that all the changes and variety of weather, experienced in the temperate zone,

* Fires are rarely seen, in the middle states, between the 10th of May and the 10th of October. *June*, July, and August are the months in which the evenings are much too warm for fire.—Trans.

† Liancourt.

throughout the year, have happened at Hudson's Bay in twenty-four hours; but he thinks himself justified in extending this observation much farther, for, in his cellar, the thermometer stood at 81, in the next story at 102, and in the upper one at 105 degrees; yet these violent heats would still be tolerable, were it not for the sudden changes that take place in the temperature. December 10, 1757, the temperature was 86, and on the 11th of the same month it was at 38, a difference of 48 degrees.

In the northern regions, the same fluctuations prevail, with this difference, that the greatest changes are usually, in the north, from cold to heat, and, in the south, from heat to cold; and, consequently, the effects produced by these vicissitudes are, in the north, chiefly connected with contraction, in the south, with dilatation. In Bougainville's manuscript journal, I found the following facts recorded:

December 11th, 1756, Quebec. Within the last three days, the glass has risen from 10 degrees below 0 to 32. To-day it rains and thaws, and a south wind makes the weather as sultry as in spring.

December 14th, afternoon. The wind has just veered round to north-west, and it freezes hard. The glass is at 25 degrees. On the 15th, it rose to 79 degrees. A mild gale from the south-west, and a beautifully clear sky.

January 18th, 1757. The wind north-west; the glass 29 degrees below 0. Clear, and intensely cold. Travellers arrive with their noses, hands, and feet

frozen. The cold more moderate in the lower town than in the fort, the latter having a north-west exposure, and the former being sheltered on that side.

At Hudson's Bay, the accurate and judicious observers Umphraville and Robson mention similar facts. They relate that, during the twenty or thirty hot days of summer, the nights continue sultry, but in winter, gales from the south raise the temperature from 8 and 12 degrees below 0 to 32, which occasions the sultriness which Bougainville complained of at Quebec, a circumstance surprising to the inexperienced natives of France or Britain, who shiver in the temperature of 32 degrees; but the sensation is similar to what is produced in us by a change from 32 to 75 degrees, or in an African by a change from 75 to 115, our notions of heat and cold being, in all cases, merely comparative. Hence it is, that, at Charleston, people complain of the cold, when the temperature does not exceed 55 or 60 degrees, and consume, in consequence, as much fuel annually, according to Liancourt, as at Philadelphia, where the mercury falls 35 degrees lower.

From all these materials, and from daily observations I myself made on the American atmosphere, it was easy to perceive a correspondence between these vicissitudes of temperature and certain changes in the wind. When the wind changed from north-east or north-west to south or south-east, a transition immediately took place from cold to heat; whereas the opposite transitions, from heat to cold, always accom-

panied changes of the wind from south or south-east to north-west or north-east, throughout the whole extent of maritime country, from the Gulph of Florida to Hudson's Bay. Here we have one material for erecting a theory, by which the phenomena of these climates may be explained; but as a few facts form an inadequate foundation for a rational theory, I shall not be in haste to draw my general conclusions, but proceed to quote some appearances, which, at first sight, may look like exceptions to the above-mentioned rule.

3. The temperature of the vallies of the Ohio and the Mississippi is warmer, in the proportion of three degrees of latitude, than that of the maritime districts.

This singularity deserves a more careful examination, because it has never hitherto, to my knowledge, been accurately described. For the principal fact, I shall borrow Mr. Jefferson's own words*.

" It is remarkable, that, proceeding in the same parallel of latitude westwardly, the climate becomes colder, in like manner as when you proceed directly north. This increase of cold continues till you reach the top of the Allegheny, which is the highest land between the ocean and the Mississippi. Thence, descending in the same parallel to the river, the change is reversed, and, if we credit travellers, it becomes warmer than it is, in the same latitude, on the sea coast. Their testimony is strengthened by the

* See Jefferson's Notes on Virginia.

vegetables and animals known to subsist and multiply there naturally, which does not happen on the coast. Thus, catalpas grow spontaneously on the Mississippi, as far as the latitude of 37°, and reeds as far as 38°; paroquets winter on the Scioto, in the latitude of 39°. In 1779, the thermometer was at 90 degrees at Monticello, when it was 110 at Kaskaskias."

My own observations enable me to confirm and extend these statements of Mr. Jefferson. While travelling, in the summer of 1796, from Washington city to Vincennes, on the Wabash, I made some notes, among which the following are the most important:

1796, May 5. Strawberries appear, for the first time, at Annapolis, near the shore, and at the level of the sea.

May 12. The first strawberries at Washington, where the land is somewhat higher.

May 30. The first at Frederickstown, at the foot of the Blue Ridge, about 120 feet above the sea. Here cherries ripen as late as at Albany, 140 miles north, but on a level with the tide.

June 6. The first strawberries in the vale of the Shenandoah, westward of the Blue Ridge, and probably 900 feet above the sea.

July 1. At Monticello, the wheat harvest commenced, at the foot of the South-west Mountain, fronting the south and south-east, while, on the opposite side, it did not begin till the 12th or 14th.

July 10. Harvesting at Rock-fish Gap, on the summit of the Blue Ridge, 1150 feet high. It was earlier, by two days, in Staunton valley, 230 feet lower.

July 12. Harvest on Jackson's Mountain, a height of 2200 feet.

July 20. Harvest on the Allegheny, 2600 feet high.

Thus we perceive the harvest later and later, as we go higher and higher.

Descending the opposite side, the harvest at Greenbriar, in a low plain, took place on the 15th, or five days earlier than on the summit.

In the valley of the Grand Kenhawah, at the mouth of Elk creek, it began on the 6th.

At Gallipolis, on the Scioto, on the 11th.

At Cincinnati, further north, on the 15th.

Wheat is not grown at Vincennes. The products chiefly attended to are maize, tobacco, and cotton, all which have been deemed congenial to a hot climate.

July 1. Harvest had commenced at Kaskaskias, and this was as early as at Monticello.

The second line from the Allegheny is less uniform than that just described, by reason of the greater irregularity of the surface, and varieties in the latitude. Cincinnati is not so forward as Gallipolis, because it lies somewhat north, and is, at the same time, less screened from the boreal blasts, and less accessible to kindly gales from the south. The earlier harvests of the Kenhawah valley, notwithstanding

its superior elevation, are owing to its being narrower and having steeper sides, which concentrate the heat. The heat I found greater here than elsewhere. The influence of different aspects is exemplified in our ordinary gardens, where the ripening of fruits depends upon the quarter of the sky to which they are exposed, on the distance or vicinity of walls, which reverberate the sun's rays, or ward off chilling and unwholesome blasts. It is true, however, that the law resulting from elevation is generally fulfilled in the parallel mentioned, and that the time of harvest coincides, with remarkable exactness, at Monticello and Kaskaskias, which are both in the same latitude, and nearly at the same level above the sea.

It must not be denied, that there are several appearances, in the state of the temperature and the progress of vegetation, in the western country, not to be explained by the elevation or aspect. One of the most remarkable of these appearances has been noticed within a few years, but is now confirmed by daily observation. Naturalists have observed, in comparing the places, on either side of the Allegheny, where certain plants grow spontaneously, that there is a difference between them, equivalent to three degrees of latitude, in favour of the valley of the Ohio and the Mississippi. Trees and herbs are found on the western side of the mountains, three degrees farther north than the same products are found spontaneously growing on the eastern side: thus, cotton, which flourishes at Cincinnati and Vincennes, in latitude

39°, cannot be raised, in Carolina, further north than 35° or 36°. It is the same with the catalpa, sassafras, papaw, pakan or Illinois nut, and many other plants, which I am not sufficiently conversant with this branch of natural history to enumerate*.

Through all the seasons, proofs of the milder temperature of the *tramontane* regions continually occur. All the intelligence I was able to collect, in my journies on the Ohio, and during my residence at Gallipolis, Limestone, Washington *(Kentucky)*, Lexington, Louisville, Cincinnati, and Vincennes, agreed as to the following facts:

That winter commences near the solstice, and does not prevail, with any rigour, longer than seven weeks after it. Even during that period, there are intervals of mild, genial weather. The mercury, in general, falls no lower than to 20 or 18 degrees. Frost is seen, for a few days, in October, and after vanishing for three, four, or five weeks, re-appears at the end of November, but is not permanent or rigorous till near January. The brooks, creeks, and pools are then frozen, but seldom continue fast bound more than a fortnight; frequently they are free again in three days.

In the winter of 1796, the mercury fell to 2 degrees below 0, and the Allegheny, Monongahela, and Ohio were frozen over from the 28th of November to the 30th of January, a period of 65 days, but this was

* Dr. Barton, the celebrated botanist of Pennsylvania, told me he was preparing a treatise on this interesting subject.

considered as a case without example. The Wabash is usually frozen in winter, but only for five, ten, or fifteen days. In Kentucky, and throughout the vale of the Ohio, the snow remains from three days to ten, and even in January they experience hot sultry days, when the mercury rises to 66 and 72, with the wind at south or south-west, and a clear sky. The spring is ushered in with showers, blown from the north-east and north-west, and the heats become great and permanent within forty days after the equinox. For sixty or seventy days ensuing the summer solstice, they prevail with the greatest intensity, the thermometer ranging between 90 and 95. This period is tempestuous, storms almost daily occurring on the Ohio, and these storms rather aggravate than moderate the heat. Rain is sometimes brought by the south and south-west winds, and sometimes is formed by the vapours rising copiously from the river and the immense forest that overshadows all the country. The rain, which descends in torrents, gives only momentary relief to the parched soil, and the heat of the ensuing day obliging it to re-ascend, it forms heavy morning mists, which afterwards become clouds, and thus continually renews the electrical process. The river water is at the temperature of 64 or 66. After a night of dead calm, a breeze is called up from the west or south-west, between eight and ten in the morning, which dies away about four in the afternoon.

The prevailing wind throughout the year is the south-west. This current ascends by the course of the Ohio, and comes, by the way of the Mississippi, from the Gulph of Mexico. This wind is hot and tempestuous in the valley of the Kenhawah, the temperature of which it raises, being checked by the ridges of the mountains. Its direction conforms to the winding course of the Ohio, having sometimes the direction of west and south; but it is always one and the same current of air, and prevails for five-sixths of the year, leaving to the other winds only one-sixth. It prevails equally over all Kentucky, but it is not there attended with exactly the same effects, for while the vale of Ohio, in a breadth of twelve or fifteen miles, is moistened by copious rains, the contiguous country is parched with drought, sometimes for three months together, and the cultivators have the vexation of beholding, from the summit of the hills that border this vale, a sea of mists and rains, whose skirts touch, but never overpass, this border.

At the autumnal equinox, rains come with north-east, south-east, and even *north-west* winds. The coolness they induce is the fore-runner of frost. Autumn is a season of mild, serene weather, and surpasses the other seasons in pleasantness, of which, however, there are only two, summer and winter, for *spring* is quite unknown in North America.

Such is the climate of Kentucky, and the vale of the Ohio, and it extends, with little variation, to a great distance. We must proceed very far north

before we meet with any remarkable diversity, or find any correspondence between the temperature and seasons of the maritime and inland regions. Even at Niagara the seasons are so mild, that severe cold does not prevail more than two months, though this is the loftiest part of the great platform. This circumstance agrees not with the laws arising from elevation.

The winter in Genessee, as it has been described to me, partakes not of the rigours of the same season as they are experienced in Vermont and New Hampshire, but agrees with the winters at Philadelphia, three degrees farther south. In that city, it has often been remarked, that frosts occur, more or less, every month in the year, except July. Now this cannot be said of any place in Genessee, farther south than the Oneida village, latitude 43°; whereas, east of the mountains, at Albany, frost occurs every month of the twelve, and peaches and cherries refuse to ripen.

At Montreal, in latitude 43° 20′, the temperature is much higher, and the cold of shorter duration, than east of the mountains, in Maine or Nova Scotia. Snow lies not on the ground so long, by two months, as at Quebec, though this town is lower down the river; and this is likewise an exception to the law of elevation, and for this, therefore, some other cause must be sought.

Before I investigate this cause, it will be necessary to mention some other facts and observations.

From the comparative statements already made, it follows, that, in order to measure the temperature of

the United States, two thermometrical scales must be applied to the whole country. One must be placed in the order of the latitudes, having its lowest point, or the extreme of cold, nearest the pole, at the river, for example, of St. Laurence, and its highest point, or extreme of heat, nearest the tropics, as in Florida. Between these points, the temperature varies, by regularly increasing or diminishing, in the same ratio with the latitude, the aspect and elevation being equal.

The other scale must be placed transversely, from east to west, in the order of the longitudes, and ought strictly to consist of a double scale, commencing from one common point or extreme of cold, to coincide with the highest ridge of the Allegheny, and proceeding respectively east and west, till they terminate at their highest points or extremes of heat, one of them at the sea shore, and the other at the Mississippi. In each, the temperature must be calculated from the elevation and aspect conjunctly with the distance. From these principles alone can we deduce accurate ideas of the temperature and state of vegetation in America. The sketch of a general table of the American climate, published by a society at New York, may be useful, but, in order to be accurate, we must adopt no other principles than those above-stated.

Between the climates of the inland and maritime districts there are two points of diversity, of great importance, though hitherto unnoticed. The first is,

that southward, beyond the latitude of 35° and 36°, the temperature of both regions becomes the same. The Floridas, and western Georgia, from the Mississippi to the Savannah rivers, enjoy the same climate and seasons. Hence it clearly appears, that the previous difference was owing chiefly to the mountains, this diversity keeping pace with them, and ending only where they end.

Secondly, the superior warmth of the western quarters ceases to take place when you reach the great lakes, and the latitude of 43° and 45° north. On leaving the southern shore of Lake Erie, the cold incessantly and prodigiously increases. At Detroit and Niagara the same climate prevails, but from Lake St. Clair the cold is much more severe and permanent than at Detroit. That lake is frozen over every year from November to February. South and south-west winds, which moderate the weather at Lake Erie, occur less frequently here, and no fruits but winter pears and apples reach maturity.

At Machillimakinaw, 2½° further north, observations made in 1797, under the direction of general Wilkinson*, show, that from August 4 to September 4 the thermometer, in several places beyond Lake St. Clair, never was higher at noon than 70 degrees, and that, in the morning and evening, it often sunk to 46 degrees, which marks a colder atmosphere than at Montreal, on the same parallel.

* See New York Medical Repository, vol. I.

These statements fully accord with those lately published by Mackenzie. While at Philadelphia, I made acquaintance with that respectable traveller, and procured from him much information on this subject. One of his companions, Mr. Shaw, I was likewise fortunate enough to meet with, in 1797, on his return from a residence of thirteen years at the remotest stations. From the information of these two intelligent observers, I collected the following facts:

That from Lake Superior westward to the Stony or Chippewan Mountains, and north as far as 72°, a climate every where prevails, whose rigours can only be compared with the climate of Siberia. The ground, generally flat, and either naked or producing a few stunted trees and shrubs, checkered with lakes, bogs, and innumerable rivers, is eternally whistled over by violent and icy gales, coming from the north and north-west. Above the latitude of 46°, the earth is frozen the whole year. At several stations, between 50° and 56°, they can sink no wells. Mr. Shaw attempted to dig one at St. Augustine, forty miles from the mountains, but, though it was July, the earth was frozen three feet deep, and as it grew harder and harder, he was obliged to desist, after penetrating twenty feet.

The testimony of these gentlemen is incontestable, but it receives new strength from the evidence of other travellers. Robson, who, in 1795, built Prince of Wales's Fort, at Hudson's Bay, in latitude 59°, relates, that, in attempting to sink a well, in Sep-

tember, he found the earth, to the depth of three feet, thawed by the previous warm weather; then a stratum of eight inches, frozen as hard as a stone; under this a loose sandy mass, dry and full of frost, where his borers could find no water, because, as he imagined, the intense cold, arresting the descending waters, prevented them from sinking below a point where the heat of summer might have thawed them*.

Umphraville, a factor of the Hudson's Bay company, from 1771 to 1782, and a careful and judicious observer, likewise affirms, that the greatest heats of summer, which are very great for four or five weeks, do not thaw the earth to a depth of more than four feet, even where the wood has been removed, and the surface exposed to the full force of the solar rays; but where the scanty shade of the pines and junipers protects it, it is not thawed above two feet deep.

Hence it is evident, that, beyond a certain latitude, the eastern and western regions have the same temperature. This line, being about the latitude of 44° or 45°, and skirting along the lakes and Algonquin Mountains, limits the warm climate of the western country, to an extent of nine or ten degrees, a space bounded, on the other three sides, by mountains. This peculiarity is occasioned, in some manner or degree, by these bordering ridges, but what is the grand and primary cause? This is the problem to be solved, the discovery to be effected; and as vari-

* An Account of Six Years Residence at Hudson's Bay.

ous observations have concurred in pointing out, as the principal agent in these events, an aerial current constantly prevailing in the valley of the Mississippi, and which is widely different from those winds that prevail along the sea coast, it will be here necessary to explain fully the laws by which the winds of the United States are governed.

CHAPTER VI.

The Winds of the United States.

IN Europe, especially in France and England, the inconstancy of the winds, and the consequent changes of weather, are frequent topics of complaint; but, in this respect, we experience nothing comparable to the fluctuation and caprice of winds and weather in America. For near three years together, from October, 1795, to June, 1798, I never saw the wind at the same point for thirty hours at a time, or the mercury remain stationary for ten hours. The wind is in incessant change, not merely a few points, but from one point to its opposite; from north-west to south and south-east, from south and south-east to north-west; and these variations are of more importance, and attract attention the more, because the vicissitudes of temperature are equally sudden and great. In winter, on the same day, snow will fall in the morning, with an east or north-east wind, and the mercury at 32 degrees; at noon, the mercury will

rise to 45 or 48, with the wind at south or south-east; in the evening it will be 28 or 30, with a north-west wind.

In summer, a calm may be expected at two o'clock in the afternoon, the thermometer at 86 or 88 degrees. Rain succeeds, with a south-west wind, at four or five. The wind speedily veers to the north-west, strong and cold, and at midnight the thermometer sinks to 68 or 70. Autumn is the only season when a succession of a few fair days, and a steady gale from the west, may be expected. This mutability is the more remarkable, inasmuch as it extends through the whole maritime country, from the sea shore to the mountains, and from Halifax to Charleston, the same vicissitudes taking place nearly at the same time, through all this vast extent. Particular positions of the surface, and of the sun above the horizon, have doubtless some effect on these aerial currents, and winds, local and partial in their prevalence, may sometimes be observed; but it is strictly true, that the winds of the United States blow, in general, over an extensive surface, and the same blast is much more amply diffused than in Europe.

This is more particularly true of the three principal winds, the north-west, north-east, and south-west. These powers appear to have shared the dominion of the air among them. Dividing the year into thirty-six parts, we may affirm, that these three engross thirty or thirty-two of these parts, the north-west and south-

west having each twelve of them, while the east and north-east have six or eight. The rest of the year is distributed among the south-east, south, and west: the north can hardly be admitted to any share.

Each of these winds, having considerable influence on the weather, and being itself an effect of something else, will be examined and explained in due order.

I. OF THE WINDS BETWEEN NORTH AND EAST.

No wind occurs so rarely in the United States as the north. From the tables I have seen at Boston, Philadelphia, and Monticello, it does not blow eight days in the whole year in these latitudes. It seems to be most frequent in the southern countries, from observations made at Williamsburg, and quoted by Mr. Jefferson, in his Notes on Virginia. These summary notices, however, appear to be extremely vague, and, if admited as true, we may conjecture that this wind at Williamsburg is local, and owing to the course of the adjacent stream, which flows south into James River. The course of a general wind is often inflected, from 30 to 80 degrees, by the hollow of a river, a ridge of hills, a lake, forest, or the like. It is at least certain, that, both east and west of the Allegheny, a north wind seldomer occurs than any

other*. When this wind blows, it is is generally moist and cloudy, and always cold.

This circumstance seems, at first view, hostile to the general theory of winds, which refers all movements of the atmosphere to the action of the sun's rays, by which it is unequally dilated, and commotion occasioned in establishing an equilibrium between masses which are light or heavy in proportion as they are warm or cold. Hence it is that the atmosphere is continually shaken by streams moving in different directions, and that the cold dense air of the north, must, by the law of equilibrium, be constantly flowing southward, to fill up the room made for it by the dilatation and levity of the air near the tropics.

Though the influence of these general laws is obstructed or modified by local circumstances, we shall prove that the American winds are all reducible to this principle, and that the debt which the north owes the south is fully paid by its collaterals, the north-west and north-east, these winds being armed and supplied from the great arsenal of the north.

NORTH-EAST WIND.

This wind, like most others, changes its qualitities with its country. In Egypt, where it is named *gri-*

* This assertion is confirmed by the tables of Dr. Ramsay, at Charleston, which give but four days to this wind in a series of four years, from 1791 to 1794. In 1792 it never once occurred, and it is no less rare at Quebec.

gale, I found it gloomy, chilly, and oppressive; in the Mediterranean, it was rainy and tempestuous; in France, particularly north of the Cevennes, it is dry and parching; and, lastly, in the United States, it is dreaded as the harbinger of wet and cold. We need only look at a map of the world to perceive the cause of this diversity. In Egypt, this current overtops the snowy ridges of Taurus, which ranges north of Syria, and not having time to imbibe moisture or warmth in its short flight over the extremity of the Mediterranean, it passes, for the most part, unaltered over Egypt.

As we go westward, this current comes to us from the Archipelago and Greece, where it imbibes some degree of warmth, and crossing the broadest part of the Mediterranean obliquely, it absorbs a great deal of humidity, and distils rain on the coast of Spain.

In France, south of the Cevennes, by blowing over the Alps, it becomes dry and cold, but it rarely occurs, its place being usurped by a collateral wind, called, by the Provencals, the *mistral*. North of the Cevennes, it reaches us only after traversing the continent, from Russia through Poland and Germany, and in this long course it parts with all its moisture, and gives us nothing but a settled cold. If we push this line a little north, we shall see it traversing the White Sea, the Baltic Sea, and the Bothnian Gulph, from which, and from the bogs of Finland, it sucks up moisture in abundance, which it again pours along the coast of Sweden, and carries to Norway nothing

but its cold. This desiccation is likewise promoted by the ridge of Dofine mountains, which divides the two countries, and intercepts the clouds and vapours.

In North America, this wind acquires humidity without heat by traversing a vast extent of water, which reaches to the pole. It bears this character throughout the maritime country. Its approach may always be discovered by the deliquescent state of your salt, soap, or sugar. The sky is soon overcast, and the scattered clouds, if previously there be any, quickly coalesce into a dark and universal canopy. If the air be cold, these clouds congeal into snow; if hot, they dissolve into rain.

From Cape Cod to Newfoundland, this wind fills the air with the chilliest and most benumbing fog I ever witnessed, and at Philadelphia, as at Cairo, I could tell when this wind blew, on waking in the morning, merely by the sensations it produced. In both places it oppresses the brain, and produces torpor and head-ache*.

If this state of the body, or one similar to it, be necessarily produced by a given state of the atmo-

* It is the error of all observers to represent particular effects as general, and occasional appearances as constant. There are many natives, as well as visitors, at Cairo and Philadelphia, who are totally strangers to the sensations here described, as connected with the north-east wind. They experience nothing but the sensible consequences of wet, cold, and the absence of sunshine, which are rather uncheering to the fancy than directly hurtful to the health.—TRANS.

sphere, must we not believe that the physical and moral constitution of man is greatly influenced by the state of the air? And may not these causes explain the diversity we meet with in the character of nations, some being distinguished by lively wit and keen perception, and others by torpor and feebleness of mind*?

The north-east wind possesses these qualities in a less degree as it goes southward; but, even in Georgia, they are sufficiently perceptible, and the name of this wind is sure to suggest images of *cold*, *wet*, and *disagreeable*, from Halifax to Augustine.

On crossing the Allegheny, this language and these associations are changed. There the emigrants from Massachusetts and Connecticut are surprised to find this wind rather dry than wet, rather light and pleasant than heavy and irksome; but the cause is evident. As in Norway, this current is arrested and disburthened of its vapours, by the ridge of mountains which screens the western country on the north and

* *Bœotium crasso jurares aere natum*, said a philosopher and poet.—V. It is somewhat surprising that notions, so crude and so generally exploded, should be countenanced by our author. The mental influence above-described operates through the medium of the body; and though a native of a warm, serene climate may be discomposed and stupified by cold fogs and rains, they tend to harden the constitution of those exposed to them from birth, and the mind is not enfeebled or impaired by this cause, except through the body. This evil influence, therefore, is only to be dreaded by weak and effeminate forms, which a mild and serene climate is more likely to produce than a bleak and churlish one.—Trans.

east. Hence it seldom carries the wished-for rain, especially in summer, to Kentucky and the vale of the Ohio; and hence also it happens, that, when rain comes from this quarter, it continues at least a day, and sometimes three days, because a very considerable chasm must be produced, above the valley of the Mississippi, to bring the vapours unbroken and entire over the mountains, and the sun must rise once or oftener, before the equilibrium is re-established, on both sides of the ridge. This occurs oftenest in winter, because then the atmosphere is every where more turbulent and mutable. The east and north-east winds will then frequently cross the mountains, and clothe the western regions with snow, or deluge them with rain; but they are soon driven from these precincts by their great adversary the south-west, which reigns here five-sixths of the year. When the contest proves obstinate, they both ascend vertically to the upper regions, and there turning back, they glide away horizontally, or sink again to the lower strata*. Sometimes the south-west overpowers its antagonist, and keeps onward to the ocean; at other times the north-east wins a passage to the Mississippi and the Gulph of Mexico.

These commotions are most violent at the equinoxes, when the sun, by carrying its ardent influence from one pole towards the other, produces a great

* *Glissent horizontalement, ou se reversent dans les couches inférieures.*

revolution in the atmosphere, and the equilibrium being suddenly destroyed between large masses and adverse currents of air, the uproar of the elements extends far and wide. At these periods, of course, and in April and October, occur those tornadoes, which, in the United States, most commonly owe their birth to the north-east wind. These whirlwinds move in narrow veins, about half a mile broad, and four or five miles in length. Within these lines, they twist off and lay level the largest trees, and their course through a forest is like that of a reaper through a field of wheat. Sometimes, though rarely, their progress is more ample, and they traverse the whole country, an incident which I shall explain when I come to consider the laws of the south-west wind.

The prevalence of the north-east wind, in the maritime country, is partly owing to the direction of the coast and of the inland mountains, which conforms to the course of the airy current. Observations made at Monticello, Frederickstown, and Bethlehem, prove, that at times when the wind is north-east at Newport, New York, Philadelphia, and Norfolk, there prevails a different wind inland. The partial reign of this wind is sometimes manifested, by the snow it brings with it extending less than ten miles from the shore. There fell, at Norfolk, on the 14th February, 1798, at night, more than forty inches of snow, the wind at north-east; whereas, twenty-five miles inland, it did not even rain, and the wind tended to north-west, as the newspapers of the day recorded. The change from

north-east is generally to east, which, though less frequent than the former, is, in like manner, abundant in rain and cold, especially north of 40°. Southward of this, it becomes lenient and milder, but it is still wet, which the temperature of the sea, from which it blows, and of these latitudes, sufficiently accounts for.

This wind is not to be confounded with the tropical or trade wind. This never extends further north than 32°, and only thus far when the summer sun rarifies the northern atmosphere, and thus forms a vacuity to be supplied by this stream. In winter it does not reach further than 22°, being repulsed at this time by the colds of North America, and at the same time drawn southward by the ascent or rarefaction of the atmosphere in South America, on which, at that season, the sun exerts his full force. At all times, and even when the fluctuating east and north-east prevail in the Atlantic Ocean, they are separated from the trade wind by an intermediate space of calm, or of counter streams, whence arises their unequal temperature; their density, and velocity. There is also another difference between them. Though generally capricious and irregular, the extra-tropical north-east and east prevail at the equinoxes, and for forty or fifty days afterwards. Hence this season is most favourable to the voyage from Europe, and the opportunity is anxiously seized by the merchant ships. Before or after this period, the prevalence in winter of the north-west, and in summer of the south-west winds, occasions a long delay. These winds

allow but little time to the south and south-east winds, which I shall now proceed to explain.

II. SOUTH-EAST AND SOUTH WINDS.

The south-east wind, in the United States, bears some resemblance to the sirocco of the Levant, which also blows from that quarter, being hot, moist, light, and rapid, and producing, though in a much less degree, the same torpor of the brain, and the same uneasy sensations.

Since the *kamsin*, or south wind, in Egypt, and the south-west at Bagdat and Bussora, have the same properties, which they imbibe in consequence of sweeping over a burning surface of sand, *fountainless and dry*, we may naturally impute this influence to the operation of caloric, or some combination of that fluid, on our nerves. This inference is favoured by the actual quality of these winds, since the south-east wind in America is more supportable than the same wind in Sicily, because it loses some of the qualities which the sands of Africa imparted to it, in its passage over the Atlantic, and the sirocco of Naples is more lenient than the kamsin and harmattan, because the former is obliged to cross the Mediterranean, while the latter blow over an uninterrupted extent of dry land*.

* Here again a native of America will be surprised to find himself continually exposed to the horrible sirocco, kamsin, and har-

When the south-east blows in winter, in the maritime country, which most frequently happens at the approach of the equinox, it is apt to occasion thaws, even in Canada, one injurious effect of which is to spoil the meat, of which, in cold countries, there is usually provided a store for five or six months. In the south, these unseasonable gales give a spring to vegetation, and call forth, in January and February, those germs and blossoms, which the speedy return of frost is sure to destroy.

Near the equinoxes, especially the vernal, this wind is apt to generate storms, more particularly near the coasts of Jersey and Maryland. These *gales* commonly last about twelve hours, and they resemble a hurricane or tornado, in raging within a narrow space of forty or fifty miles in length, by a breadth of fifteen

mattan, of Africa. A mucky breeze from the south will *sometimes* discompose him in the sultry mornings of August, but it is rare that the south or south-east produces any remarkable effect, nor, though always warm, and sometimes wet, does it deserve to be in any respect compared to the poisonous breath of the African deserts. The south-east wind in North America does not, in fact, traverse any part of Africa, but comes over the whole south Atlantic, and over the bogs and woods of Brazil and Guiana. The south wind comes from the region of the Andes, and the Gulph of Mexico. The sandy Africa lies between east and east-north-east of the United States, which winds are moist and cold, as might be expected from their journey over so much water, notwithstanding the hot and dry point from which they may be supposed to set out. The parching and suffocating kamsin and siroc, therefore, or any degree of them, cannot be known in North America.—TRANS.

or twenty. Two examples of this occurred within my own observation at New York, and one at Philadelphia, where there raged so violent a storm for half a day, that all the ships near the coast were supposed to have been wrecked, whereas, twelve hours after, many vessels arrived in perfect safety, which had experienced no extraordinary wind.

This violent irruption of hot rarified air, cannot be explained by ordinary principles, since every other air is colder and denser than this. We must therefore suppose it produced by the dilatation of a large quantity of air, by means of heat, and which, of course, drives to a greater distance the colder air that is contiguous. The bays and mouths of rivers, where this stormy wind most frequently occurs, having a conical or funnel-like outline, favours this opinion : for a large body of air being forced into these inlets, is pressed into a channel that grows narrower and narrower. An appearance similar to this takes place in a pool of water, which, if the banks be entire, remains in equilibrio and at rest ; but if a narrow outlet be made, the water crowds to the opening, where a deficiency is first occasioned, and its impetuosity depends, first, upon the degree of general pressure, and, next, upon the amplitude of the space, in which it diffuses itself after escaping through the outlet. This exterior space, with respect to the wind in question, is the middle region of the atmosphere, somewhat less, perhaps, than three thousand feet above the surface, and the south-east torrent pours into this region

by ascending, like all heated fluids. There it is either condensed by the freezing stratum above, or flows off horizontally beneath it; or, perhaps, acquires a vortiginous direction around a horizontal axis, about fifteen hundred feet high, its circumference brushing the surface of the earth. As to the cause of this previous vacuity above it, unproduced by thunder, or any other obvious meteor, a great number of preceding and attending circumstances must be investigated in order to discover it; but, as I possess not these necessary data of enquiry, I shall not attempt to supply their place by conjecture.

OF THE SOUTH WIND.

We should naturally suppose a wind directly from the south would be hotter than one from the south-east, yet, in this country, it is cooler. In summer, when it prevails most, they deem it a cooling and agreeable breeze, since it impregnates the air with moisture. This vapour, I observed, at Philadelphia and New York, accompanied with a strong smell of sea marshes, such as oysters have, and by these unpleasant means it indicates its sources*. It tempers

* The south wind at New York comes directly and wholly from the sea, and the dampness it breathes is saline to the taste: at Philadelphia it comes from the sea over the sandy tracts of Delaware and Maryland, and the senses of a native cannot perceive the odour here mentioned.—TRANS.

the heat produced by the direct and reflected rays of a burning sun, in June, July, and August. For the sake of this breeze, a southern aspect is generally preferred for a house in the United States, as in France we prefer, on a similar account, an east and south-east exposure. The course of the summer sun is so high above the horizon, that it does not enter apartments shaded by piazzas, which are generally in use throughout America*. In winter its course being lower, the house is cheered by its oblique rays, in spite of the keen north-wester, which is then the usual accompaniment of sun-shine, but from which it is screened by a blank wall†. At this season, if the south wind be cold, it is made so by the snow which sometimes lies upon the ground in Carolina. If it bring snow instead of rain, this arises from the clouds, from the north and north-east, encountered on its course, and not having time to retreat back into the ocean, or towards the pole. Such snows immediately dissolve, or turn, while falling, into rain. Six hours blowing will derive from this wind the warmth and moisture which the tropical seas impart to it. At Philadelphia, March 10, 1798, it produced the temperature of Florida. In summer, when it is brisker than usual, it

* Piazzas in the country and in villages only. In the large towns, an awning protects shops and booths.—TRANS.

† The thermometer, at noon, on the north side of a wall, will sometimes sink to 20 degrees, while, on the south, it shall rise to 35 ; on one side it shall freeze intensely, while, on the other, the clods shall be slippery and wet.—TRANS.

ultimately produces a storm; and it is remarked at Louisville, and other places on the Ohio, that thunder is sure to follow its continuance for twelve hours. If we rate its motion at forty-five or fifty miles an hour, twelve hours will enable it to bring to the Ohio the vapours of the Gulph of Mexico. The prevalence of this wind, in summer, proves a powerful attraction to the north, at this season, in North America; but whether this centre of attraction is within or beyond the Algonquin Hills, north of the great lakes, cannot be ascertained but by contemporary observations made on the line extending, from the coast of Florida, through Kentucky, the Lakes Huron and Erie, and over the Algonquin Mountains, to Hudson's Bay. These would greatly elucidate the laws of re-action between the polar and tropical atmospheres, and between the north-west and south-west currents, which are chief among American winds.

III. THE SOUTH-WEST WIND.

The south-west is one of the three most prevalent winds in the United States, is more frequent in summer than in winter, and in the western than the maritime regions. In winter, it is unable to surmount the Allegheny, from which it is probably repelled by the counter-blasts from the north-west, north-east, and east. Sometimes it overcomes these obstacles, and rushes more impetuously, as well

as with greater cold, than its customary moderation and its sources would allow us to expect. These extraordinary qualities it owes to the mountainous country, covered with snow, and the plains, deluged with wet, which it is obliged to traverse.

In spring, it occurs more frequently, bringing temporary snows, torrents of rain, and even hail. These may be considered as belonging to the north-west, north-east, and east, whose cloudy freight, arrested by the Allegheny, it turns back and drives before it. This mountain is, indeed, the frontier on which these hostile winds contend. The observer, on the plain, may see the clouds tending towards the Blue Ridge, on the wings of the east or north-east wind. There they are checked, and either disappear in rain, or fly back before a south-west wind, which blows for a few hours. I witnessed this spectacle the evening I spent at Rock-fish Gap, on the Blue Ridge, and mine host, though no philosopher, explained very satisfactorily the reasons of what he saw.

At the summer solstice, the south-west prevails more steadfastly than any other, in the maritime country. It is then the chief agent in the storms, which rage in July and August, with a violence unknown in France. A gale, which usually rises from the south, at ten or eleven o'clock, yields, at noon, to the south-west, which darkens the afternoon with thunder clouds. For a few hours, the most vivid lightning and the loudest thunder are accompanied with heavy rains, but at sun-set the roar is stilled, and the clouds

break and disperse, and an evening of enchanting coolness and serenity succeeds the hubbub and glooms of the tempest.

At the autumnal equinox, the north-east takes its turn to reign, with some intermissions, for forty or fifty days. The south-west then revives, and shares the rest of autumn with the north-west, which now begins to be keen and brisk, and with the west, which is the most equable, serene, and bland of any in America.

The south-west, in the vallies of the Mississippi and Ohio, as far as the St. Laurence, is more uniform and simple in its progress. It prevails, we may venture to say, for ten months out of the twelve, from Florida to Montreal. For two months only, at the winter solstice, the north-west and north-east rule the air. Afterwards it revives and strengthens, as the sun approaches the zenith, till, in July and August, it is nearly as steadfast in the western regions, for forty or fifty days, as the trade wind is at the equator. It prevails nearly as much on the St. Laurence, and ships are obliged to wait a month for a wind to carry them up that river, and then the wished-for gale is brief and transitory. It is this wind that thaws the river, in April, as the north-west freezes it again, in December. The south-west, as well as the south, is the hot wind of Canada, Vermont, and Genessee, but it properly merits this name only in summer, for it cools as the sun recedes from the zenith, or the land

verges towards the pole, and is hottest near the Gulph of Mexico, which is its focus.

Being so near this focus, it raises the temperature of Lower Louisiana, in winter, so much, that the intermeddling winds from the north, north-west, and east, which are pretty frequent, cannot check the growth of the sugar cane, especially the species brought from Otaheite. This advantage is outbalanced by the excessive heats of summer, which bring with them almost daily storms, like those that sailors call *white squalls*. This stormy season begins after the solstice, and its progress is remarkable. At first, the humid and suffocating heat reaches its height about five in the afternoon; tempestuous clouds then roll from the mouth of the river, and from the south-west parts of the Gulph of Mexico. These clouds rise some minutes earlier every day, so that, in the middle of August, thunder is heard about two o'clock in the afternoon. Heavy rain accompanies its tremendous peals. By sun-set all is still, and the sky is sometimes clear, and sometimes obscured by mists, which the sun sucks up from the neighbouring marshes. The night is calm and sultry, and infested with mosquitoes. Next day, the heat increases as the sun approaches the meridian, and is greater as the air is calmer, and in the afternoon the customary storm succeeds. The south-west wind drives these tempestuous clouds towards Kentucky and Tenessee, where they meet and mingle with others exhaled

from rivers, swamps, and lakes, and thus the gloomy canopy is uninterruptedly stretched as far as Canada.

Justly to estimate the laws of this great aerial current, and its influence on the surface of the earth which it sweeps, to determine the nature of the reservoir which supplies it, which is the atmosphere of the Gulph of Mexico, many circumstances of these regions must be investigated and compared. The northern tropic passes over the middle of this gulph. During the six summer months, its whole surface is exposed to the rays of a vertical sun, by which an immense evaporation is produced. During the six winter months, the solar influence is still powerful enough to exclude frost from the precincts of this sea. The shores of Yucatan, Campeachy, Vera Cruz, Florida, and Cuba, are all extremely hot. This heat arises from the contiguous gulph being surrounded on all sides by high land, by which the air is rendered stagnant, and this gulph is more vexed by alternate storms and calms, thunder, water-spouts, and whirlwinds, all of which necessarily attend a moist and fiery atmosphere, than any other water in the torrid zone.

These circumstances will fully account for the qualities which the south-east wind in North America possesses; but the enquirer will naturally ask, whence is supplied this immense reservoir, from which such abundant streams are incessantly flowing?

If we carefully inspect the map (No. II.), we shall see, that the two mouths or outlets of this gulph are

placed between the isle of Cuba and the peninsulas of Yucatan and Florida; that by the opening on the side of Yucatan, which is the largest of the two, this reservoir receives water and air, from the Atlantic Ocean, through the intermediate Gulph of Honduras and the Caribbean Sea; that through the other and narrower outlet, between Florida on one side, and Cuba and Bahama on the other, the contents of this reservoir are continually flowing back into the Atlantic, and that the access of air on this side is obstructed by a triple chain of islands. We shall see that both these channels lie between the latitudes of 20° and 24° north, and that of Yucatan, supposing it to extend through the Caribbean Sea, falls as far down as 10°. Now, since the eastern trade or tropical wind blows throughout the year on the Atlantic; since this wind springs up about three hundred miles from the coast of Africa, and moves 24 miles an hour, and, after a progress of six hundred miles, reaches the Caribbean islands, we shall naturally perceive that this immense airy flood must easily surmount this insular barrier, and that, on entering the interior sea, it is hemmed in and compressed between St. Domingo and Jamaica on the north, and Tierra Firme on the south, and thus driven into the Bay of Honduras, and ultimately makes its way into the Mexican Gulph: thus it supplies the waste of air occasioned by the south-west wind.

It is this steady current from the east, which produces most of the phenomena observable in the gulph.

Its first recess is violent, because the entrance becomes more and more narrow. The insular mountains break and divide this current, as a stream of water is broken and divided by the piers of a bridge, and these obstacles, as in water, produce eddies. By being divided and compressed in the channels between these islands, its force is augmented, and on issuing from them, it expands again with violence, and each current forming eddies in its rear, they contend with each other for the vacuity. These conclusions are strengthened by observing, as we coast these islands, the various courses which the wind assumes, as the distance from them varies.

These motions are parallel to what take place in a stream of water, allowance being made for the greater levity of air; and careful observation of the eddies which occur under a bridge, or among the obstructing rocks of a torrent, will afford accurate notions of what happens in the present case, and in all airy currents.

Some may suppose that the trade wind would naturally keep on its course westward, notwithstanding the interposition of the grand isthmus of Mexico; but air, though so much lighter than water, is subject nearly to the same laws, and does not easily transgress the limits of its customary channels. It is clear that the mountains of Honduras and Nicaragua, which are elongations of the Andes, form an insuperable barrier to this wind. To judge of this with accuracy, we must know the height of these

ridges, and the thickness of the stratum of moving air. This stratum may possibly be thinner than we should at first imagine, for aerial voyagers assure us, that the strata of the atmosphere do not often exceed 600 feet in thickness, and that contiguous masses often move in opposite directions, so that two or three different winds may be found to blow in an ascent of three or four thousand feet. New observations on this head would be highly serviceable, and would particularly throw useful light on the subject before us.

As to the Mosquitoe or Nicaragua Hills, let us suppose their height to be, in general, only 1800 feet. This mound would obstruct and repel the trade wind, to a degree that would leave it all its volume and force. What would escape over the top, would be a useless superfluity, but we cannot suppose that any of it thus escapes, since no trace of it is found, beyond this ridge, on the coasts of the Pacific Ocean. There, the customary winds are widely different, being the local breezes to and from the sea. These penetrate several miles inland, and extend 100 miles to sea, at which distance ships may expect to light upon the general winds. The latter commonly blow, especially in summer, from the west, and are therefore directly adverse to Atlantic gales. They prevail from latitude 10° to 21°, quite along the Mexican coast, from Cape Bianco to Cape Coruntas.

Neither does the trade wind turn aside and cross Panama, since there the summer gales blow south

and south-south-west, from the Pacific Ocean.—Hence it is evident, that the Andes of Mexico are its insuperable boundary, and whatever be its height, is the border line between two sets of winds.

Thus obstructed, the trade wind must find a vent. That between Jamaica and the Mosquitoe shore presents itself of course, and through this it rushes into the bay of Honduras. The mass, however, is not perfectly entire, for sidelong and detached currents skim the adjacent lands. Mariners relate, that from Cape Vela, one projecting point of the gulph of Maracaybo, the winds vary, and swerve into a course *parallel** to the grand stream, shutting up the bays of Santa Martha, Carthagena, Darien, and Porto Bello. Some are influenced by the mountains and rivers on this shore, and blow from south-east to north-west. Some blow west, and are real counter-currents, such as we meet with in the course of all rapid streams of water, and such as so much aid the navigation of the Mississippi. On the right of the grand stream, another detached portion forms a south wind, which, from June to August, fans the coast of Cuba and Jamaica, and thus again, we see the whole force and natural direction of the stream only in the middle of it.

On entering the bay of Honduras, it veers a little to the south-east, and encountering no new obstacles, it enters the Gulph of Mexico. The bank of sand called Yucatan is interposed between the two bays,

* Does not Volney mean oblique, or perpendicular?—TRANS.

but its level is too low and uniform to constitute any obstacle. Accordingly, Bernard de Orta, who has published* some useful information on the winds of La Vera Cruz, tells us, that the south-east prevails in all these parts.

If, then, we imagine a volume of air, three hundred miles in breadth, by fifteen hundred feet in depth, that moves at least half a mile a minute, and is accumulated in the great basin formed by the Gulph of Mexico, it is evident that, from the curvature of the edge of this basin, and from the diminution of the propelling power, this stream, considered as one and entire, must acquire a rotary or vortigenous motion, whose axis or centre, though not permanent, is chiefly found in the northern part of this gulph, whence it parts with its superfluity to the adjacent lands, and hence a principal cause of all appearances near this spot, and in the south-west part of the continent, whose winds and meteors are influenced from this quarter.

Pursuing the course of the grand stream, we shall quickly see it divide itself into numerous branches, all which obey the primary impulse, in connection with, and modified by, certain local and partial causes.

The first of these branches crosses Yucatan, coasts along La Vera Cruz and Panuco, and, impelled by the original force, and by the Tlascalan Mountains,

* In the Supplement to the Mexican Gazette, for October, 1795.

penetrates the inland of Mexico, and along the channels (or vallies) of Panuco, Las Nacas, Del Norte, or Bravo, with those of all their branches, assails at length the mountains of New Biscay, New Mexico, and Santa Fe. Without any actual observation I may safely affirm, that in all these regions the prevailing winds are from south to east.

No doubt it is this current which, having reached the mountains of New Mexico, assumes new qualities, and pours down upon the north-west coast, so skilfully examined by Vancouver, and blows, in summer, as far as Nootka.

Captain Mears, who made many useful observations there, in 1791, represents the south-east wind, in that quarter, as violent, tempestuous, wet, and *piercing cold*. These qualities, so rare in the south-east wind in the northern hemisphere, it acquires in its passage over the cold summits of the mountains of New Mexico, which are so deeply clothed with snow and ice, as to obtain the name of icy and shining*. These hills are not unworthy of comparison with their parent stock, the Andes. The south-east wind of Nootka owes its strength to their altitude, for Mears likewise tells us, that the reigning wind, in the ocean absurdly called *Pacific*, blows, in sum-

* How happens it that this moving stratum is able to surmount these hills? Its primary impulse must be lessened; it must have parted with much of its heat, and consequently grown denser, and of less thickness; hence must be less able to surmount this ridge than that of Nicargua.—Trans.

mer, from the west, as far as the latitude of 30°, "where begins the zone of eastern trade wind." It thus appears, that the parallel of 30° forms the boundary line between two winds exactly opposite. This western gale, mild and serene, is the counter-current of the eastern trade, which, being brisk and rapid, produces, by its friction with the adverse stream, those calms, squalls, and whirlwinds, so fatal to the early circumnavigators.

A second branch of the trade wind, within the former, and taking off the larger portion of the whole remaining volume, blows towards the shores of Louisiana and Florida. Its general direction is south-west, but, on the Mississippi, it is rather south, the navigators of that river observing that they experience, strictly speaking, only two winds, the south and north, which arises from the constant conformity between the course of the rivers and that of the contiguous currents of air. It may also be naturally expected, that it should have a tendency directly south sometimes before it becomes steadily south-west, and that this tendency should particularly prevail in the neighbourhood of Bernard's Bay.

A third branch endeavours to cross the peninsula of Florida to the ocean beyond; but the eastern trade wind reigning in the Atlantic, during summer, as high up as latitude 30° or 32°, meets and checks its career, and finally turns it back towards the gulph. This returning wind, mingling with the one last mentioned, tends, among other causes, to add unusual

force to the south-west wind of the United States, in July and August.

The middle portion of this great stream, kept in equilibrium by opposite impulses, gives rise to the variable winds, calms, squalls, and tornadoes, which infest the Gulph of Mexico.

These inferences are all confirmed by the experience of navigators. Don Bernard de Orta, commandant in the port of La Vera Cruz, assures us*, that the south-east and east are, in summer, the predominant winds, in the south part of the gulph. In winter, they veer to north-east, and bring along with them transient but violent squalls. Bernard Romans, an English traveller, who published, in 1776, a very intelligent and useful book on the Floridas†, tells us, that the north-west and west are prevailing winds at the curved shore, where the continent shoots out into the peninsula, and such is exactly the course of the airy current in returning to its fountain in the gulph.

Lastly, these writers, as well as every navigator, assert the frequency of water-spouts, whirlwinds, hurricanes, squalls, and calms, in these seas.

Some philosophers have already noticed the agreement, as to time, between the hurricanes of the Gulph of Mexico and tempests even far north upon the continent. Dr. Franklin compared the hour at which a north-east storm, that traversed the country from Bos-

* See his Dissertation on the Winds, &c.

† Natural and Civil History of the two Floridas: New York, now very scarce.

ton to Florida, in October, 1757, was felt at different places, and found that the airy motion began at Boston several hours after its commencement near the Gulph of Mexico, and that it began later and later, as the distance from the gulph augmented. This circumstance, which ordinary enquirers considered as fortuitous, the inquisitive mind of that philosopher perceived could only be accounted for by placing the commencing point of this motion in the gulph, and by supposing it occasioned by the northern air rushing in to fill a vacuum produced there by the rarefying heat of the sun, in the same manner as water in a trough is set in motion by opening it at one end; that which is nearest the opening beginning to move first, and this motion gradually extending to the further end.

This simple explanation has been confirmed by subsequent observation and experience. Every year, between the 10th and 20th of October, a storm of twelve or fifteen hours duration usually occurs in the north part of the United States, particularly on Lake Erie; and always, at the same time, news are brought us of a hurricane on the coasts of Florida and Louisiana, *with northerly winds**.

* This coincidence merely proves the extent of the storm, and not the priority of its occurrence near the gulph. Few or no observers have investigated this fact with the minute accuracy of Dr. Franklin, or ascertained, like him, the commencing point or velocity of the gale.—Trans.

The suction exerted at the gulph is evident; but how is this vacuum produced, and why does the air, with which it is replenished, flow from the north-east? for this is the quarter whence the inland storms, whether universal or partial, generally arise. By carefully examining the history of winds, and arranging all the facts which I have been able to collect on this subject, I think I have qualified myself for solving this mysterious problem.

Stormy clouds have not yet been subjected to the analizing processes of chemistry, nor their mode of acting on each other, their violent detonations, the rapid solutions that take place in consequence of these, the sudden and mighty condensations by which a vast bulk of vapour is converted into a small quantity of water and cold air, been as yet demonstratively explained; but many important facts, and their consequences, are not unknown, and some satisfactory conclusions may be built upon them.

It is known that all clouds have moist surfaces; that they are produced by the evaporation of water, and by the volatile principles it contains; that evaporation is proportioned to the previous heat, dryness, and renewal of the air; and consequently clouds are generated by the combination of water with caloric, the igneous, or the electrical fluid, which, in my opinion, are merely different names of the same thing, either in a simple or compound state. This fluid, essentially volant and centrifugal, fastens itself to particles of water, which is, comparatively, a gross and

heavy substance, and forms of them little balloons or floating vesicles, filled, sustained, and animated by different portions of this fiery essence. Hence we may consider clouds as a kind of volatile neutral salt, combining air, water, and caloric, all which principles become sensible to us at the instant of their reduction or detonation; the water in the form of rain; the fire in the lightning that gleams and the thunder that roars; and the air in its influence on the touch, on the nerves, and on the respiring organs. All clouds, however, are not fraught with thunder, nor tempestuous. To make them such, a larger portion of caloric appears necessary, clouds being capable of absorbing or imbibing different quantities of that fluid. Caloric seems to enter more sparingly into the composition of clouds above the sea, because there the aqueous vapour abounds, and the temperature is low, and hence they are less tempestuous and *detonant*. Seamen observe, that storms are rarer as we go further from land, and are more violent, as well as frequent, as we approach it. Hence we may infer, that a principal cause of storms is great heat or abundance of caloric, and this abundance is greatly owing to reflection from the earth's surface. Many substances, rare or unknown at sea, contribute to this effect, as volatile mineral substances, sulphur, and the gasses which exhale from animal and vegetable bodies, in the state of putrefaction or maceration. These gasses abound in wet and marshy places, whose matters are much more susceptible of heat than mere water, and

such places particularly abound in the regions under our consideration, for all the Delta of the Mississippi is half immerged in water, partly fresh and partly brackish. All the west bank of the river, fifty miles wide, and four hundred long, is buried under an annual deluge. Five hundred miles of the shore of the gulph, from Mobile Bay quite as far as Rio del Norde, consists entirely of marshes. The shores of Yucatan, Cuba, Campeachy, and Florida, is an endless swamp. We may easily conceive what immense exhalations must arise from a surface of this kind amounting to many hundred square miles.

It is clear, likewise, that when clouds differently charged approach each other, and come into contact, a commotion ensues, for the purpose of equilibrating the electric fluid and every other gas, in each. In this effort, the electric fluid exerts more energy and more velocity than the air and water, and, from its extreme tenuity, all its parts unite at once, and their separation from every other fluid is instantaneous. In consequence of this separation, the water, now free, operates with its natural gravity. Hence the rain, more or less copious, that follows lightning, which is a ray from the electric fluid in its simple state, and the thunder, produced by the concussion of the air rushing into the vacuity occasioned by the sudden condensation of the aqueous vapour into water.

When we recollect that water converted into steam occupies eighteen hundred times more space than it

did as water, and that even at a less degree of heat than boiling it expands to a thousand times its former bulk : of consequence, that a cloud of a thousand cubic fathoms may be suddenly reduced to one, or at the most to ten ; and that the air rushes into the vacuum hereby produced, at the rate of 1380 feet in a second, that is, with the velocity of a cannon-ball, we shall no longer wonder at the force of those winds, which, under the name of squalls, water-spouts, and tornadoes, uproot trees, overwhelm houses, and wrench from their places twenty-four pounders with their carriages, many instances of which are known in the West Indies. In fine, the sudden formation of vacuums in the atmosphere are the general cause of all the motions to which the air is subject.

These vacuums readily explain the cause of the north-east and north-west winds of the United States, and the tempests which sometimes attend them ; for if the same mass of air diffuse itself between Lake Erie and the Allegheny on one side, and the Andes of Mexico and Darien on the other, it is plain, that if a considerable condensation is effected by a thunder storm, in the air over the Mexican Gulph, a vacuum takes place, into which the air of the Mississippi valley must rush with violence, whose motion will of course propagate itself further north, the air behind moving continually forward to supply the place of the air before. This motion usually takes a north-east course, because the south-west wind is that which is deficient and withdraws itself, so that

the north-east may be considered as the return of the south-west.

It is proper to consider the space above-described as filled with one entire mass of air, as a kind of aerial ocean or lake, bounded by the western, south-western, and northern mountains, and the West Indian isles. The Allegheny, while it bounds this viewless lake on one side, is likewise the shore of a similar expanse of air, that of the maritime country, on the other. Now the latter being contiguous to the northern and north-eastern atmosphere, whose reservoirs supply its currents, is relatively cold and dense, while that of the western waters is warmer and lighter, consequently the former continually exerts a pressure on the skirts of the latter, and tends to overflow on that side. As soon, therefore, as the counter-pressure of the western atmosphere ceases, by its being set in motion south-west, the maritime air overflows and spreads itself in the same south-westerly direction.

The almost regular recurrence of a north-east storm in Autumn must, however, have a cause equally permanent, and this, I think, may be traced in the great revolution which takes place in the whole atmosphere, when the sun passes the equator. While the sun continues north of this line, and in the neighbourhood of the tropic, its radiance must occasion unusual heat in the northern continent, and thus create a focus of suction, towards which all the prevailing winds must tend. Thus the atmosphere of the torrid

zone is pushed to the verge of the polar circle, and there checks and circumscribes the fury of the northern blasts; whereas, when the sun has re-passed the line, it becomes, in twenty or thirty days, that is, about the middle of October, vertical to the broadest part of South America. The reflection of its hottest rays, from so vast a surface of land, creates here a new focus of vacuity, to which the circumambient air must flow in immense volumes, and all the winds, to a great distance, must acquire a new tendency in this direction. The northern airs are then permitted to diffuse themselves as far as the tropic, the trade wind is confined to the narrower limits of 18° 20° or of latitude, and hence arise those periodical north-east winds that flow from the ocean into Guiana, from December to March or April, when the sun is over Paraguay. These winds, after discharging the superfluous humidity on Guiana, pursue their course to the Andes. Hence also those northern winds, which, after October, prevail in the Mexican Gulph, and extend as far as the Andes of Darien.

The sun's passage to the south of the equator is a moment of revolutions and commotions, which reach from one polar circle to the other. At the instant of one of these changes, the air of the gulph, suddenly impelled toward the south, leaves behind it a vast vacuity, into which the air of the Mississippi regions pours itself, and since the period of twelve hours, during which the autumnal storms rage in the United States, is nearly proportioned to the space requiring

to be traversed and replenished, the cause here assigned to them seems liable to no objection. To the existence of vacuums formed by detonation can alone be ascribed those mysterious hail storms, during which we see descending from the atmosphere masses of ice weighing several pounds*. The electric explosion having suddenly disengaged the caloric contained in an immense mass of vapours, which are instantly condensed into falling water, the icy air above rushes into the vacuum, compressing the drops together, and freezing them, and whirls them aloft into

* I had long entertained doubts as to these enormous hail-stones, said to weigh many ounces, and even pounds; but the storm of 13th July, 1788, convinced me of the truth of such reports. I chanced, on that day, to be at Pont Chartrain, ten miles from Versailles, and walking out, at six o'clock in the morning, I found the sun intolerably hot, and the air calm and suffocating, in other words, extremely rarefied. The sky was without cloud, yet I heard four or five peals of thunder. A quarter after seven, a cloud rose in the south-west, which presently obscured the whole horizon, and hastened swiftly to the zenith, with an encreasing wind. A storm of hail suddenly assumed, the stones falling obliquely, at an angle of about 45 degrees, so large, that they might have passed for fragments of mortar from a wall that was pulling down. I could scarcely credit my own eyes. Many of the pieces were larger than my fist, and many of them were plainly fragments of still larger masses. As soon as I could safely venture, I picked up one of them, which weighed more than five ounces. Its shape was very irregular. It had three horns or projections, as big and nearly as long as my thumb. I was credibly informed, that a hail-stone at St. Germain weighed more than three pounds; after which, nothing of this kind can surpass belief.

the upper region, with the same force with which it tears up trees, or beats down houses. All hail storms are therefore accompanied with wind, whose violence is generally proportioned to the size of the hail.

In the same manner may water-spouts be explained, which are vortigenous masses of air and water, seen only in cloudy weather, and commonly attended by thunder and a calm. These move over the sea, and sometimes over land, shaped like an inverted cone, whose base is a cloud, and whose point below pours out a torrent, sometimes sufficient to sink a ship.

These were once attributed to submarine volcanoes, spouting out those watery columns as whales do. Such cases may possibly exist, but then the column would be stationary, and very bulky : but the common water-spout moves along with great speed, apparently vagrant and capricious in its course, and must therefore be differently accounted for. We may suppose, that in a turbulent atmosphere, whose detonations are limited and partial, vacuums take place in the middle regions of the air, more slowly, and to a smaller extent, than in regular storms ; into these, however, the clouds are drawn, and are suddenly condensed into rain by a contiguous mass of cold air, which acts like a cold effusion in the steam engine. Whether this rain is upheld by the density or heat of the lower air, or by the whirling motion of the vortex itself, its different threads are joined together in the shape of a funnel, whose top is the dis-

solving cloud, and whose point touches the sea, where the water takes a natural descent.

The conical figure of the mass is produced by the same cause, though acting in an opposite direction, as the similar shape of the flame, observed in the great fires kindled in the American woods by the clearers of land. They collect into one heap, in the middle of the field, the trees they have felled, that they may burn the easier, and with less danger to the trees which remain. They set fire to this immense pile, which sometimes covers an acre, and, when fully kindled, we observe the flames bending inward to the common centre of the pile, from which they aspire in the form of a cone, the point of which possesses the same spiral motion as that of the water-spout. In both cases there is a confluence of air from all parts of the circumference to the centre, where in one case it rises, and in the other descends, with a spiral motion to a point; the fluid in the first case being relatively light, and in the other heavy, and acquiring this kind of motion by the pressure or opposition of the air, which they pierce or bore.

A water-spout may possibly be occasioned by the friction of two opposite streams of air, that being sufficient to produce a gyratory motion. If one were colder than the other, the cloud would condense, and all the usual appearances would follow.

I have now, I think, clearly proved that the south-west wind of the United States is the tropical or trade wind with an altered course, and that of consequence

the air of the western country is imported from the West Indies through the Gulph of Mexico, and thus is it distinctly seen why the temperature of the western regions is higher, by three degrees of latitude, than that of the maritime country, though only parted by a ridge of mountains, and why the superior activity of a warm air, when free from mounds and impediments, promises to all these tracts a very great improvement of their climate, by the removal of the forests. This improvement will be more speedy and considerable in the country near the lakes, and even in the vale of the St. Laurence, than in places farther south, eastward of the mountains. This effect begins already to appear, since that river is now shut by the ice nearly a month later than when Canada was first visited by Europeans, and marine insurances, which at the beginning of this century contained a condition to sail by the end of November, now require ships to leave the river merely before the 25th of December. Some drawbacks on this hope will indeed be found, in the history of the north-west wind; but before I enter on the history of this wind, I shall take this opportunity of speaking of a phenomenon, which has an intimate connection with the facts first detailed, but which has received less attention from geographers than it deserves: I mean the great current in the Gulf of Mexico, called the gulf stream.

IV. OF THE GULPH STREAM.

The influence of the tropical wind is not confined to the air only. Blowing over a space of three thousand miles, this wind heaps up water in the Gulph of Mexico. To what height this kind of inundation raises the expanse of the gulph above its natural level, we are furnished with no means of judging. The Spanish government has sometimes thought of connecting the two seas by a canal, at Darien, but it has not caused the respective levels to be ascertained. I can, however, assert that the level of this gulph is several feet higher than that of the Gulph of Honduras and the Caribbean sea, and still higher than that of the South Sea. I deduce this fact from its analogy to the state of the Mediterranean, and of lakes of a certain extent, where a steady wind of a few days creates a rise or flood of two or three feet, at that end to which it blows. This is very perceptible in the harbour of Marseilles, where I have seen the water raised thirty inches by easterly winds, whereas a westerly wind produces opposite effects. The French engineers have found a variation of thirty-three inches on the coasts of Syria and Egypt.

The rise, in the present instance, must be much greater, as the wind is so much more powerful and steadfast, and operates upon a greater mass of water. As the Red Sea has been found to be near thirty feet higher at Suez than the Mediterranean at Damietta,

it is natural to infer a similar disparity between the South Sea coast and that of the United States.. It is obvious, however, that whatever be this height, the fluid must somewhere subside to the same level; but this cannot be by the reflux of the waters of the gulph through the channel of Yucatan and Cuba, because this is adverse to the current of air and water which forms this very redundance. It must then relieve itself by issuing through the channel of the Bahama islands. After coasting the shores of Mexico, Louisiana, and Florida, it turns the southern point of the peninsula, under shelter of Cuba, and the sand banks of Bahama, which ward off the refluence of the ocean on the east, and repel the trade wind.

The celerity of the gulph stream is a proof universally known of the height of the fountain, in the Gulph of Mexico. After passing through this channel into the ocean, its identity is still preserved, by a course of four or five miles an hour, and likewise by its colour and temperature, which is from 10 to 22 degrees hotter than the contiguous water. This remarkable stream coasts the whole of the United States, varying in its breadth, which, at a medium, is forty-five or fifty miles. Its force is not destroyed, nor its peculiar properties lost, till it reaches Newfoundland, where it diffuses itself suddenly, in the direction of north-east.

The gulph stream first attracted the attention of sir Francis Drake, at the end of the sixteenth century, who conjectured its true cause; but its most remark-

able property, the warmth of its temperature, escaped his notice. This was not observed till 1776, when Dr. Blagden, experimenting on the temperature of the ocean at different depths, was struck by this peculiarity. He found the thermometer, in the latitude of 31° north, off Cape Fear, when plunged into the sea, stand at 72 degrees. Presently it rose to 78, and continued so many leagues, when it suddenly sunk again to 69 and 67. Here they approached the coast, the water became green, and they got soundings.

This discovery attracted much attention in England, which was much augmented by the observations of Dr. Franklin, the next year, on his passage to Europe. Mr. Jonathan Williams, his companion on that voyage, pursued this subject still further, and after repeated experiments, laid the foundation for the following conclusions:

1. The gulf stream pursues a settled and distinct course from Florida to Newfoundland.

2. It conforms to the direction of the American coast, at a distance varying with the state of the wind, but generally of 23 leagues.

3. As it advances, its force lessens, and its breadth encreases.

4. It has hollowed out a very deep channel in the bed of the ocean, for in it you can reach no bottom with a very long line.

5. It wears away the south-eastern shore of the United States, though opposed by the rocks of Hat-

teras, which turn it a point and a half towards the east, and which it will, at some future time, overwhelm and destroy. The sandy isles of Bahama, the banks along the American coast, and the shoals of Nantucket, appear to be merely heaped up by this current. I am, indeed, tempted to affirm, that the banks of Newfoundland merely constitute a bar at the mouth of this vast *shoreless* river.

6. On each side, it forms eddies or counter-currents, which, aided by the depositions of the rivers, forms the muddy stratum or deposit, termed *soundings*.

7. A south-west wind, of long duration, makes its limits and course less distinct, by driving the ocean billows in the same direction; but the north-east wind, being directly adverse to it, makes it more conspicuous, by causing such a heavy sea, as mariners call it, as greatly to endanger vessels of single decks and deep waisted.

8. When the colour of the water changes from the sky blue of the ocean, or the olive green of *soundings*, into a deep indigo green, you are in the gulf stream. Examined in a glass, it is colourless as that of the sea between the tropics, and is more saline than the rest of the Atlantic.

9. A great plenty of floating weeds denotes your near approach to this current.

10. The incumbent air is warmer than in the neighbourhood. The ice, which may chance to cleave to a vessel entering, it immediately melts.

You find yourself drowsy, and the space between decks becomes unpleasantly hot. Some facts will give distinct ideas of this high temperature.

In December, 1789, Mr. Jonathan Williams, sailing from the Chesapeake, noted that, in the water of the sea, the mercury stood,

1. In soundings, - -	47 deg.
2. Approaching the stream,	60
3. In the stream, -	70
4. In the stream, near Newfoundland,	66
5. At Newfoundland, out of the stream,	54
6. Beyond the bank, in the open sea,	60
7. Approaching the English coast,	48

Captain Billing, on a voyage to Portugal, June, found, near the American coast, and within soundings, - - 61 deg.
In the gulf stream, - 77

Now there appears here a difference of 15 degrees. According to Mr. Williams, who examined it in winter, the difference is equal to 10 degrees, so that the difference, as might be expected, is less in summer than in winter.

These observations have led to another important discovery. After numerous trials, it is found that the temperature of the water varies with the depth, being colder as it is shallower.

In July, 1791, captain Billing likewise observed, that three days before he came in sight of Portugal, the mercury sunk, in a few hours, from 65 to 60 degrees, and this variation coincided exactly with the

line where the ocean became fathomable. Mr. Williams likewise observed, during another voyage, in November, that, on approaching the English coast, the mercury fell from 53 to 48 degrees; and both these gentlemen remarked, that the sudden sinking of the mercury indicates a shoal beneath*. This effect arises from the bottom of the sea being colder than the water above it, or because evaporation, which always cools, has a more perceptible influence in shallow than in deep water†.

From the phenomena, just detailed, of the gulf stream, some light will be reflected on two facts in the natural history of the American coast. First, if we admit what I have asserted, that this current is one cause of the alluvial soil bordering its channel, its still or retarded waters depositing the matters sus-

* The learned traveller, Humboldt, to whom we owe many new and important observations, also found, that, in shoal water, his glass sunk $6\frac{3}{4}$ degrees. Lalande, who deemed this observation perfectly new, was doubtless unacquainted with the facts above related.

† We may here suggest the possibility, by maturing and extending this discovery, of finding out a scale for measuring the depth of the sea, similar to that applied to the height of mountains, the thermometer, in one case, being the instrument, as the barometer is in the other. We may also suggest to the enquirer, whether the great depth of the gulf stream has not some effect upon the thermometer, as well as the warmth of the water. By the observations of Williams and Billing, it should seem that the *depth* has an influence on the temperature, not only of the air above, but of the water itself.—Trans.

pended in it, we shall no longer be surprised at the occurrence of tropical productions, in a fossil state, in the northern regions. By this, or some such current may have been brought these masses of petrified shell-fish, found in digging wells and pits on the coast of Ireland*, and which have no resemblance to any but the shell-fish of the tropics. It cannot be denied that the gulph stream prolongs itself beyond the banks of Newfoundland.

Secondly, Viewing the spread of this current near Newfoundland as the mouth of a great river, we see the reason why cod-fish so much abound there, and why they are attached to these waters; for the stream carries with it, as it coasts along the United States, all those animal and vegetable matters which float down the rivers and inlets, and these carried onward till the current loses its force, it is natural that these fish should resort to the spot where their favourite food is most apt to accumulate.

Thirdly, The gulph stream will supply us with an explanation of the incessant fogs, for which these latitudes are noted; for as a large mass of tropical water is continually brought northward by this current, which is nine degrees warmer than the neighbouring sea, in the first place, a more plentiful evaporation must follow, and, secondly, the vapours thus exhaled must be condensed into mists by the native atmosphere above and around; this atmosphere being sub-

* Philosophical Transactions, vol. X, XIX.

jected to the chilling influence of the north-west and north-east winds.

I shall now return from this digression, though it scarcely deserves that name, since the airy and aqueous currents are inseparably connected together, and since the gulph stream is a collateral effect of these causes which modify so much the atmosphere of the United States*.

* While this sheet was in the printer's hand, I received from America the fifth volume of the Transactions of the Philosophical Society, of Philadelphia, which contains, p. 90, a paper by Mr. Strickland, in which he recounts a series of observations, made in 1794, on a voyage to and from Europe, that fully confirm all I have advanced above, on the indications of depth to be drawn from the thermometer. This observer adds, that he noticed a branch of the gulf stream, in the parallel of Jaquet Island, latitude 47° north, longitude 39° west, and he dwells on the probability of the products of the tropics, having been conveyed by this current to the coasts of Ireland. He has given new force to my conjecture, that the bank of Newfoundland is the *bar* of this *river*, whose current, before these sands were collected together, pursued a straight course to Ireland, but after the obstacle was formed by the gradual accessions of many ages, was compelled to turn off to the east. The gravel of this bank might be compared, with some advantage, to that of the Atlantic coast.

CHAPTER VII.

Of the North-west Wind.

THE north-west wind is almost the chief wind in the United States. It differs, in two respects, from the south-west, inasmuch as it is cold, dry, and even stormy. It is more frequent in winter, of which it may be deemed the harbinger, than in summer, and is more rife eastward of the Allegheny than west of it. It can be compared to nothing so properly as to the mistral of Provence, which blows, in like manner, from the north-west, though it has an origin much less remote than the American wind. The mistral, a stranger north of the Alps, and the mountains of Auvergne, and the Vivarais, has its source within the limits of our temperate ocean, in the upper regions of the hills that border the vallies of the Rhone and Durance, where it prevails with most fury, and its chief source appears to be the summits of the Alps, which cool the neighbouring air, and occasion it to rush down upon the southern vallies, and parti-

cularly that of the Rhone, where its career being checked by the hills of the Vivarais, it traverses all Provence in a north-west direction. The descent of this stream is the more violent and rapid, since the force of its natural gravity, and the pressure of the atmosphere above it is augmented, by the void which it finds over the Mediterranean, and which is formed by the burning coasts and plains of Africa. Hence it is always observed first at sea, and afterwards successively in the districts situated inland. Currents from the tops of the Vivarais hills may possibly mix themselves with the stream from the Alps, but the latter is the chief of these torrents, for the principal reservoir is doubtless placed among the loftiest Alps. Without this supposition, the mistral, in some of its appearances, could not be explained. Its flight, after every rain, is as sudden as the report of cannon, especially in hot weather.

The American north-west is likewise, in some degree, sudden and abrupt. In many cases, as will hereafter be shown, it comes from the upper regions of the atmosphere, but commonly, particularly when of long duration, it comes from the polar seas, and the icy deserts, north of Lake Superior.

The cold brought by this wind was formerly imagined to proceed from the five great lakes. This opinion has been since exploded, in consequence of more accurate knowledge of the country beyond these waters. It was, indeed, long ago remarked, that, in Vermont and New York, the cold was no less intense

than in the countries leeward of the lakes; and the Canadian traders, who extend their excursions far beyond these waters, have removed all doubt from this subject. These pilgrims affirm, that the farther they penetrate into what they term *the great north*, the stronger and more icy are the north-west gales, and that it is the chief plague of this naked and swampy Siberia, and of the country traversed in ascending the Missouri to the western mountains. The source of this wind must therefore be sought among the deserts, which, between latitudes 48° and 50°, are frozen nine or ten months in the year; in the Frozen or Arctic Ocean, which commences at the parallel of 72°; and in the northern ridges and slopes of the Chippewan Mountains, which are always buried in snow. Beyond these mountains, on Vancouver's coast, the north-west has more moisture and less cold, because they receive it directly from Beering's Bay and the ocean: but this is a variable wind, and belongs to another system. The north wind, according to captain Mears, is the reigning wind in this quarter.

The degree of cold which icy surfaces impart to the air has been noticed by the missionary Charlevoix, who relates, that while crossing the bank of Newfoundland, in warm weather, the ship was suddenly assailed by such a freezing wind, that the people were obliged to shelter themselves below. Soon after, they perceived an island of ice, such as are annually floated from the north into the Atlantic.

While to leeward of this island, which was near a mile long, the cold was extreme. Those who navigate these seas frequently encounter these temporary and freezing blasts.

On the Atlantic coast, this wind, after traversing the continent, comes sometimes freighted with rain, snow, and even hail. But these more properly belong to the north-east and south-west, which are checked in their course, and driven back, encumbered with all their vapours, on their own footsteps. This moisture it sometimes imbibes from the lakes, rivers, and marshes which it is obliged to pass over. Hence, in the places leeward to the lakes, and the general course of the Mississippi and Ohio, this wind is distinguished as wet in winter and tempestuous in summer. Elsewhere, on the contrary, for instance, along the coast from Charleston to Halifax, it is noted not only for being keen and violent, but likewise dry, wholesome, elastic, and invigorating. In some respects, it is a treacherous gale; for, when invited abroad by the bright sun and clear sky, you find yourself assailed by a most cutting blast, which makes the face sore, and fills the eyes with tears, while sudden and fitful encreases of the whistling blasts make your footing insecure upon the slippery ice. Less boisterous in summer, it is wished for, because its influence tempers the scorching rays; and, indeed, this wish is usually gratified after heavy storms of rain and thunder. On such occasions, it can only come from the higher regions of the atmosphere, which, in

these regions, are about ten or twelve thousand feet above the surface, because a half hour would scarcely be sufficient to bring it from the distant north. In these cases, a vacuum being produced below by the condensation of the vapours, the upper stratum must sink down to fill its place, and its peculiar direction is owing to the lightness and warmth of the south-western air, which therefore must yield to the pressure of this denser and colder mass. It is prevented from taking a southern course, by the reflux of the south-west and of the trade wind, whose counter-current occupies these middle latitudes.

From the combination of all these currents springs up, from latitude 35° to 48° and 50°, north, that western breeze, so constantly prevailing on the coasts of England, France, and Spain.

Williams, in his history of Vermont, confirms this representation, by remarking that their north-west and west breezes always begin on the sea-side; that is, if several ships lie on a line, that which is furthest at sea feels the wind first, and so successively to that one which is nearest the shore. Mariners observe the same progress in the winds near the shore. The day wind, called the sea breeze, beginning far inland, at the tops of hills, which, at noon, become a sort of chimney to the neighbouring air. There the wind is felt twenty or thirty minutes earlier than on the shore, in proportion to their mutual distance, as I often noticed in Syria and Corsica, and the night wind, or land breeze, commences at the same points,

because refrigeration commences there, and its own weight carries the mountain air to the sea, just as the same principle carries along a stream of water. The true causes of these different motions in the air deserve to be examined, because they form the distinguishing marks and properties of different winds: but all these motions are ultimately reducible to changes in the density, and relative vacuities produced, among contiguous masses of air, by the absence or presence of the sun's rays alternately on the land and the sea. This order is a kind of systole and diastole, occasioned by the air alternately ascending when heated and dilated, and descending when cooled and condensed.

Dr. Belknap bears witness, in his history of New Hampshire, to these descents of the upper air. He describes a place in that state, where the wind seems always to fall from above, like the water of a mill-dam, and a remarkable instance of the same kind occurs in France, on the hills of Forez, which separate the vallies of the Rhone and Loire. In several places among these hills, particularly between Belleville and Rouane, sixteen or seventeen miles beyond Tarare, we always find, that while mounting the steeps, on the side of the Rhone, no wind is to be felt, but when you reach the summit, and still more when descending towards the Loire, a strong breeze is perceived from the east, that is, from the Rhone to the Loire, which wholly disappears when you retread your steps, from the mountain top to the Rhone.

This appearance is easily explained, by considering the valley of the Rhone as a lake of cold dense air, connected with the atmosphere of the Alps, while that of the Loire is a similar lake of warm light air, filled from the atmosphere of the ocean by the western winds. The ridge of Forez is a mound dividing these lakes, which, below this mound, are both tranquil, but, above this level, the surplus air of the Rhone overflows like water, and is colder and more rapid, inasmuch as it is the discharge, from the middle region, of air from the Alps, and descending as it sweeps the surface of the airy lake below it.

This is the proper place for removing a difficulty that arises from maintaining the greater frequency of the north-west wind east of the Allegheny than west of it, since it can hardly be imagined to pass over the former region without previously traversing the latter, which lies in the way.

This fact, which cannot be disputed, must be explained in the same manner as the winds of France, just mentioned. The Allegheny is the shore of an airy lake, which, below the level of the top of this bank, is at rest, unaffected by the movements of the stratum above it. Hence the south-west wind traverses the valley of the Mississippi and Ohio, Kentucky, and the contiguous countries, as far as the valley of the St. Laurence, by which it flows off, while the north-west stream glides over it diagonally, and, overtopping the highest Allegheny, pours down on the maritime country, where its force is augmented by its

own specific gravity, the slope of the earth's surface, and the vacuity above the ocean in the south-east.

The same movements occur in Lower Canada, and over the St. Laurence. Here the reigning wind is the south-west, and, next to it, the north-east. Very often the north-west is unknown at Quebec, while it blows in Maine and Nova Scotia, and this could only take place by its gliding over the concave bed of the St. Laurence, leaving undisturbed the air in this bed. When we observe a brisk current produced in a room, by opening two opposite doors or windows, which does not put out or even agitate a candle placed in a corner of the same room, or even ever so little out of the direct line between these openings, we are led to conclude, that air is not such a very tremulous and fluctuating fluid as we might at first imagine.

Another property of the American north-west remains to be mentioned. The mortar and plaster of walls exposed to it, are harder and more tenacious than those which have a different exposure, which is no doubt owing to its dryness. The north-western side of forest trees have a thicker and firmer bark than the other sides, and this is one among the marks by which Indians direct their journies through a woody wilderness. By such simple and natural appearances as this, carefully noted, are they enabled to display that sagacity for which they are so famous; and when visionary theorists or fire-side travellers lavish their encomiums on the instinctive adroitness and discernment of savages, and thence infer the

marvellous superiority of *the man of nature* to the civilised man, they only show us their ignorance of the art of the hunter, and the improvements of sight and smell which a life spent in hunting is sure to produce in every individual who pursues it. The fancied superiority of the *red men* has been exploded ever since the settlement of emigrants from Europe along the frontiers, who become, in a few years, more strenuous and indefatigable warriors, and more skilful and sagacious foresters, than the aborigines themselves. I shall, in future, discuss this subject in a manner which will show this race to be far more entitled to pity and horror, than to envy or applause.

CHAPTER VIII.

The United States compared with Europe, in relation to Winds, Evaporation, Quantity of Rain, and Electricity.

FROM what has been said, some notions may be formed of the climate of the United States. Since the predominant winds flow almost directly from the torrid and frigid zones, it follows that the climate must be distinguished by great heats and colds, by variable and capricious weather. Since one of the prevailing winds, the south-west, comes from a warm sea, another, the north-east, from a cold one, and the third, the north-west, from frozen deserts and lakes, the reason is plain why these winds are respectively warm or cold, clear or obscure, wet or dry. Some exceptions, it is no less clear, must flow from the local circumstances of the country. A dry wind must become rainy, when its course lies across a watery surface, as occurs in Genessee, where rain is brought by a north-west wind from the Lakes Huron

and Ontario, and by a south-west wind from Lake Erie; while the north-east and east, so rainy on the coast, are there dry. At the sources of the Wabash and the two Miamis, every wind brings rain. At Gallipolis, on the Ohio, it rains most with a west and south-west; while lower down, at Cincinnati, the west wind is dry, and the north-west is rainy.

A rainy wind must become dry, after depositing its waters on the sides and tops of mountains; and sometimes, in great airy commotions, all the currents appear to mingle, and their distinctive properties are for a time lost or confounded.

Since the mountains of this country are of the lower order, and do not offer any considerable obstacles to the course of the winds, the winds must, of consequence, be general, and sweep the whole surface of the territory. The sea and land breezes are the only exceptions to this rule. They prevail in the six summer months, and conform to the direction of the coast and of the rivers, and are influenced by the distance, declivity, and aspect of the ridges of mountains. For instance, from Florida to Jersey, the gale inclines to the south-east, and accordingly we see the land slope and the coast turn to that quarter; whereas from New York to Cape Cod, the gale is due south; and from thence to Nova Scotia its course is east and north-east, being still governed by the same circumstances. It is stronger or weaker, earlier or later, according to the degree of heat, the slope of the land, and the distance of the heights, which form the suc-

tion. In Massachusetts, the breeze commences at half after eight or nine o'clock in the morning, in June; in Carolina, it sets in at ten or eleven: the cause of this difference is perceivable on comparing the distance of the respective mountains from the coast.

From this view arise two very important facts in physical geography:

First, The temperature or climate of a country depends on its customary currents of air, or *winds*.

Secondly, The condition of the surface has a powerful influence on the course of these winds, and thus becomes a primary cause of the climate.

In Europe, the application of the same principles produce an opposite effect. In the western parts of Europe, the chief rainy winds are westerly, because they come from the Atlantic Ocean; and these are colder in England, and hotter in France and Spain, on account of the latitudes from which they proceed.

In the United States, these winds are dry, because they traverse the broadest part of the continent. In France they are prevalent beyond others, because the eastern barrier of the Alps operates as a continual cooler and condenser, and in America they are rare, from the want of such a focus.

In Europe, there are few general winds. They are divided into numerous systems, independent of each other, because the lofty Alps and Pyrenees form, in some sense, great lakes of air, separated from each other; and because a great number of secondary

ridges, like those of Spain, the Cevennes, Vosges, Ardennes, Appenine, Corpathian, Dofrine, and Grampian hills, in different parts of Europe, almost all of which are higher than the Allegheny, and which form subdivisions equally distinct.

In France, we have as many systems of wind as there are principal rivers, each river with its branches being considered as the ribs of a separate valley, such as those of the Rhone, the Garonne, the Loire, and the Seine. The Ardennes occasion a distinct and peculiar system to prevail in Flanders. The English channel supplies that province with a stream of moist cool air, which though at first west, becomes afterwards south-west, and contributes so eminently to the fertility of that country.

If western Europe be more temperate than the eastern part, it may be caused, as Pallas conjectures, by the protection it receives from the Scottish and Norwegian mountains, but it is doubtless chiefly owing to the temperature of the sea, whence come its prevalent winds, which are the west and south-west.

Hence it is that the coast of Norway is widely different in its climate from that of Sweden, and that the temperature of Bergen has as little resemblance to that of Stockholm, as London has to Petersburg. The east of Europe owes its cold, dry, and salutary airs to the east and north-east winds, which issue from the deserts of Siberia; and if Russia possessed a mountainous screen on the east, or Siberia been protected by a wall of hills from the icy breath of the

polar ocean, these countries, and even Poland, would have enjoyed a temperature as mild as Denmark and Saxony.

The atmospheric differences between Europe and North America are chiefly or solely owing to their topographical differences. We may thus explain why the annual quantity of rain is greater in America than in France, England or Germany; why the falls of rain are generally more abrupt and sudden, and the subsequent evaporation more copious and rapid; why the reigning winds are more violent, and tempests more frequent, in America than in Europe. Each of these facts I shall proceed to illustrate more particularly.

I. OF THE QUANTITY OF RAIN IN THE UNITED STATES.

Numerous observations have been made by intelligent Americans, in various parts of the country, on this subject, by which it clearly appears, that the annual and mean quantity of rain in the United States greatly exceeds that of most countries in Europe, except certain mountainous regions, or the heads of gulphs. The following table will prove this difference. No part of the western country is included in it, because I know of no observations that have been made there.

	Inches.
At Charleston, according to Ramsay, in 1795	$71\frac{4}{5}$
The medium between 1750 and 1760, according to Mr. Chalmers	$41\frac{3}{4}$
At Williamsburg, according to Jefferson	47
At Cambridge, Massachusetts, according to Williams	$47\frac{1}{2}$
At Andover, Massachusetts	51
At Salem	35
At Rutland, Vermont	41
At Philadelphia, according to Rush	30
In Europe, the known quantities are these:	
At Petersburg	$12\frac{4}{5}$
At Upsal	15
At Abo	$25\frac{2}{5}$
At London	$22\frac{2}{5}$
At Paris	$21\frac{2}{5}$
At Utrecht	$28\frac{4}{5}$
At Marseilles	$21\frac{2}{5}$
At Rome	$30\frac{2}{5}$
At Naples	$37\frac{1}{5}$
At Algiers	$29\frac{1}{5}$
At Padua	$35\frac{1}{5}$
At Bologna	$25\frac{3}{5}$
At Vienna	$44\frac{3}{5}$

Hence it appears, that, in general, one-third less rain falls in Europe than in North America: yet Mr. Holyoke, in a memoir already quoted, enumerates twenty cities of Europe, where at a mean, for twenty years, there had been annually 122 days of

rain, while, at Cambridge, there had been only 88, and at Salem 95. Hence the inference is plain, that rain must fall in much heavier showers at the latter towns than at the former ones, and all the facts observed corroborate this inference.

II. OF EVAPORATION AND THE DRYNESS OF THE AIR.

Observations, no less accurate and numerous than those above-stated, may be brought to testify, that evaporation is more rapid in the United States than in Europe, and, of consequence, that the atmosphere is generally dryer and more turbulent. This position was long ago published by Dr. Franklin, and and destroys the airy speculations of De Pauw*.

* De Pauw's work concerning the Americans is a strange book. Returning from America, I was anxious to read it, for the sake of the important information it was said to afford: but when I saw the dogmatic confidence with which he embraced false facts, how rashly he deduces from them chimerical consequences, with what earnestness he maintains the most silly paradoxes, and how acrimoniously he treats other writers, the book fell from my hand. I cannot imagine how any one can sit down gravely in his closet, and decide positively upon facts, of which he has no direct knowledge, and of which the evidence on all sides is vague and insufficient. My own experience has taught me, that nothing is more rare and difficult than to observe complex objects in the just point of view, and in their real connections; that it is quite impossible to judge truly of a country or a people, without residing in it;

The doctor describes a mahogany box, with drawers, made with the greatest nicety, by the celebrated artist, Nairne. The drawers, which fitted exactly, and were even tight, at London, became too loose at Philadelphia: but when sent back to London, they became as tight as ever. Hence he justly infers, that the air at Philadelphia is dryer than that of London: but this single case was not an adequate foundation for a general rule. But this inference has been further illustrated and confirmed by Mr. J. Williams*. He found, by a series of enquiries and experiments, that the mean annual quantity of evaporation, at Cambridge, Massachusetts, during seven years, was 56 inches, while in seven German and Italian cities, on a mean of twenty years, it was only 49, which makes a difference of 7 inches. Yet Italy is in latitudes much more favourable to evaporation than Massachusetts, which borders the Atlantic Ocean. At Salem, in one year, there was 173 fair days, at twenty cities of Europe 64. At these cities, the cloudy days were, in 1785, 113, at Cambridge 69, at Salem, at a mean of seven years, 90. Water in vessels renewed once a month evaporated 4.10 inches, when renewed once a week 6.35; a difference no doubt owing to the wind, in the former case, not reaching the bottom of

that this is more truly the case with respect to past times; and that the great obstacle to knowledge is that positive and dogmatic spirit, which is so generally inculcated by the popular modes of education.

* See Transactions of the American Philosophical Society.

the vessel. On a river, a vessel evaporated 1.15 inches, in a dry place 1.50. Four plants, weighing 118 grains, placed in a box of sand, and well watered, evaporated 10944 grains, more than ten square inches of surface would have given in the same time.

Thus it is evident that, in general, more rain falls in the United States, in fewer days, than in Europe; that there are more fair days, and more evaporation. The cause of this diversity is easily seen, in the difference between the two continents, in their topographical circumstances.

The superior quantity of rain in the United States arises from all its winds, except the north-west, and especially the most prevalent ones, coming from some sea, and having thence imbibed a great deal of moisture. That the rains are heavier and more sudden, is the consequence of the great difference in the temperature of different winds, which is very favourable to solution; and the rapid mixture of these hot and cold streams occasions heavy and plentiful rains. Our gentle showers are so rare in North America, that, when they do occur, the people call them *English rains* and *English weather*. They are sometimes apt to fall after the equinox, when people, going abroad without umbrellas, are unexpectedly wet to the skin*.

* Light showers, such as I suppose are here meant, frequently occur in May and June, but are far from producing the impressions here described. On the contrary, the Americans are apt to exclaim *English weather* only during the drizzling rains and incessant fogs, sometimes occurring in November and February,

These mixtures of winds, and the consequent variableness of the atmosphere, are occasioned by the flatness of the country, in consequence of which the winds find no considerable obstacle in their course, and thus the topography of the country exercises no small influence on its atmosphere, with respect to the abundance of rain.

In Europe, on the contrary, high mountains interrupt and break the streams of air; the atmosphere is more equable and stationary; hot and cold winds intermix less frequently: consequently solution is not so rapid; the rains are gentle; the air continues loaded for a longer time with vapours, clouds, and fogs; and evaporation is more tardy.

Evaporation is accelerated in the United States by the freedom of the winds from the constraints of an uneven surface, and the extensive prevalence of the dry north-west, which occupies two-fifths of the year.

In Europe the west, whose character is moist, prevails above other winds.

This copious evaporation will account for the heavy dews in North America. So heavy are these in summer, that I often, on waking in the western forests, supposed it to be raining, till I looked above at the se-

and which have been known to obscure the sun for seven, ten, or even fifteen days together. A vernal shower, preceded and followed by a bright serene sky, is as opposite as possible to the ideas prevalent in America, be they true or false, respecting English weather.—Trans.

rene sky, when I saw that the large drops falling from the leaves were only *dew*, that is, the water, evaporated in the day, and deposited again at night.

Lastly, the American winds are more rapid, and storms more frequent, because the tropic is nearer, and the currents of air range more freely. If the Apalachian ridges were five or six thousand feet high, the atmosphere of all the western vallies would be differently modified.

III. ELECTRICITY OF THE AIR.

The last circumstance of difference between the atmosphere of Europe and America is the quantity of the electric fluid, with which the latter is much more highly charged. This difference may be made perceptible to the senses at any time, without any complicated apparatus, merely by drawing a silk riband swiftly over a piece of woolen cloth, when the silk contracts more quickly than ever I saw it do in France. It is likewise evident in the superior vividness of the lightning, and loudness of the thunder. When I first saw thunder storms at Philadelphia, the electric fluid appeared to me so copious, that all the air was on fire. Its arrowy and zigzag lines were broader and longer than any I had ever before seen, and so strong were the pulsations of this fluid, that they seemed to my ear and my face like the wind produced by the wings of some passing bird. Its

effects, however, are by no means limited to the sight and hearing, for they often occasion the most disastrous accidents. In the summer of 1797, from the month of June to the 28th of August, the newspapers reported seventeen persons killed by lightning; and Mr. Benjamin F. Bache informed me he had counted eighty severe accidents of this kind. They are frequent in the country, especially beneath trees, and few people appear to be acquainted with the use, as a preservative at the same time from the rain and lightning, of oiled silk or cloth*.

The abundance of this fluid is an additional proof of the dryness of the air, as its scarcity in Europe is an indication of the moisture of our atmosphere. Caloric is absorbed and neutralized by water in the state of vapour, when it no longer displays its native or usual properties; for the igneous or electric fluid abounds most, and its presence is most evident, in the driest and coldest atmosphere, because, in such an atmosphere, it has no aqueous vapour to combine with. Hence it is, among other reasons, that vegetation, when it once takes place, is more rapid and active in the United States than in France. It cannot be said that the abundance of this fluid is owing

* From the use of conductors, or from some other cause, accidents from lightning are rare in the American cities. One death, from this cause, in twenty years, in New York or Philadelphia, would be a liberal calculation. The terror of lightning, which prevails greatly, especially among the female sex, is a genuine and formidable evil in America.—Trans.

to the proximity of the sun, because it is always most copious when the north-west wind is the most keen, and, according to the learned travellers in the Russian empire, it is excessively abundant in the driest and bleakest regions of Siberia.

It is worth remarking, that fogs and damps are prolific causes of disease; that they particularly excite coughs, catarrhs, rheumatisms, and, in general, obstructions in the vascular system; that they produce fevers of various kinds, but all attended with shivering, succeeded by heat. Now if moisture, in the form of mist or vapour, has a tendency to attract and absorb the igneous or electric fluid, robbing of it those bodies that previously possessed it; if this fluid be one of the vital principles of the human constitution, one of the causes of the circulation of the blood and other fluids, and perhaps the radical principle of the nervous fluid; may we not infer that aqueous vapours are injurious to us, by abstracting from the frame the due portion of this vital heat? By depriving of this animating fluid the cellular membrane and nerves, it occasions palsy, obstructions of more or less duration. Besides the preventive indication, the cure might be effected by the inverse process. The salutary influence of friction and fomentations confirms this opinion; but a more chemical and systematic operation is still to be discovered.

CHAPTER IX.

Whether the Moon has any Influence on the Winds. The Influence of the Sun. Changes of Climate produced by felling the Woods.

I HAVE hitherto said nothing of the influence upon the atmosphere, which some have ascribed to the moon. This influence was admitted by the ancients, but with them it was merely a magical or astrological connection, rather than a physical and natural one. It has, however, like many ancient opinions, been revived of late years, in a more reasonable and scientific form. It is naturally inferred, from the influence which the moon is known to have upon the tides of the ocean, that it exerts some power on a fluid still lighter and more volatile than water; and indeed it is suggested, that the impulses which water receives from the moon must be communicated through the medium of the air; that the atmosphere must also have its ebbs and flows; and hence has arisen an entire theory of winds. As mere analogy,

however specious, was insufficient for forming rational conclusions on this head, an eminent naturalist, M. La Marck, has endeavoured to corroborate it by facts. The issue of his labours it is impossible to judge of, but his method is rational and accurate. He publishes a meteorological diary, and predicts the temperature and winds of the ensuing year, calculated according to his lunar theory: thus the truth of his system is subjected to the nicest and most palpable test. Every month, and every quarter of the moon, we have an opportunity of comparing appearances with the prognostics. M. La Marck himself enables us to do this, if, as we have a right to expect, he gives us the history of the year past with the prognostics of that which is to come. Whatever be the issue of his labours, as to his own theory, truth must necessarily result from them, since they contain the infallible means of confuting or establishing his notions on the subject. It would be well, if we possessed the means, in every branch of science, of coming even at negative truths, and were enabled to discover what we *ought not to believe*.

On this subject, my own enquiries have supplied me with too many facts to leave me undecided; and were I left to judge from the experiments just mentioned, I could not admit any perceptible influence of the moon upon the winds. Admitting the action of this orb to be the cause of tides, no clear inference is deducible as to its action on the air. The great ocean of air may experience a general impulse or

pressure, while its internal and relative changes and movements may be unaffected: just as the sea experiences a libratory motion, while its interior currents remain undisturbed. The tides can only be perceived on the shore, or where the great mass of liquid meets with solid obstructions, but the aerial ocean has no such limits or obstructions. It is a sea with bottom, but without shore, and the undulations on its upper surface are, of course, far removed beyond human cognizance. Admitting the influence of the moon on the winds, they must correspond, in some degree, with its phases and revolutions, as the tides do; their courses must be periodical, and the moon's irregularities must be manifested by irregularities of the same kind in the air. Nothing of this kind, however, is observable. Fifteen out of twenty of the prognostics in the almanacs are wrong, and without admitting the infallibility of the prophet, it is only surprising that so few of these predictions chance to be right.

The winds are supposed to be most regular on the sea; but even there mariners generally agree, that all is caprice and confusion, and that nothing can be suspected to have any power over the winds, or to afford any clue in decyphering them, but the approach to land, the vicinity of capes, the nature of the coast, or the proximity to certain latitudes. It is acknowledged by astronomers, that the period of nineteen years, which brings back the same positions of the moon, has no similar effect upon the winds, whose

fluctuations conform to no such period, so that, on the whole, there appears no ground whatever for admitting the moon to have any influence on the winds.

The action of the sun is much more clear and definite, and is manifest, not only in their original formation, but in all their subordinate movements. This influence shows itself in the seeming irregularities of the airy currents, since they can always be traced to varying degrees of heat, depending on the presence or absence, the absorption or reflection, the concentration or dispersion, of the solar rays; on the height and shape of mountains; on the free or obstructed course of the winds, by a naked or wooded surface. The sun, in its equatorial position, produces the grand current of the trade wind, by which all other winds are influenced. This current is not set in motion by the rotary motion of the earth, but by the continually changing position of the vertical or meridional place of the sun, which, as the earth revolves from west to east, is continually moving forward in the opposite direction, and which is constantly followed by cold dense air, that fills up the vacuity occasioned by its heat. Hence the trade wind blows strongest at noon, and weakest at midnight. When the sun approaches the southern tropic, the zone of the trade wind follows it, and, in proportion as its dominion enlarges on one side, does it shrink and recede on the other. On the contrary, it returns north as the sun returns, and regains the spaces on the nor-

thern side, which it had before lost, and loses on the southern border in the same proportion.

This current is more regular in the Pacific Ocean than elsewhere, because the sun's action is more uniform on so vast a plane of uninterrupted water: but as land absorbs more heat than the sea, this influence is changed on approaching the continents, and the airy currents are modified by the figure, extent, and condition of the coasts and plains of India, Africa, and South America. Thus, as in summer the valley of the Ganges receives the sun's vertical rays, a focus of heat and consequent suction takes place east of the Ghauts, which divide Malabar from Coromandel, and the current called the *summer monsoon* is produced. This is a south-west gale, hot, stormy, and wet, on the Malabar coast, because there it blows from the great gulph between India and Arabia, while, on the Coromandel side, it is north-west, dry, and cold, because it has crossed the inland mountains, and, in crossing, parted with its moisture and heat.

In winter, the retiring sun gives birth to another monsoon, whose course is north-east, because the flat spaces near the Bay of Bengal, and the bay itself, are covered by a light damp air, which yields easy way to the dense and cold air rushing down from the snowy regions of Thibet.

Meanwhile, on the Atlantic, between Africa and Brazil, the same causes produce different effects, because the topographical circumstances are different. The

equatorial regions of Africa have no lofty mountains, which compel a great stream of air; the focus formed by the reflection from its maritime plains, exerts no influence beyond a distance of two or three hundred miles, and the trade wind begins only beyond the sphere of its attraction.

America is in a widely different situation. Its peculiarities consist in the shape and distribution of its two limbs or members, which form two vast islands of nearly equal dimensions; in the interposition of a great lake or gulph between them; in the narrow and mountainous neck or link of Darien, which connects the two peninsulas together, and which forms the bottom of this intervenient water; and, lastly, in that mountainous ridge, the highest on the globe, which runs due north five thousand miles, forming, on its western side, the steep and narrow shore of the Pacific Ocean, and subsiding on the east into interminable plains. From these peculiarities of surface and shape, it follows that, in South America, the sun's rays, vertical to the broadest part of it six months together, that is, from the autumnal to the vernal equinox, creates, over all the country east of the Andes, a focus of suction, by which the force of the trade wind coming from the ocean is redoubled. This centre has an attractive force far north, and gives the northern trade a north-easterly couse, by which all the exhalations of the Atlantic are carried to Guiana. All these winds find a common and unsurmountable barrier to their further progress at the Andes, and on

the eastern side of that mountain are all their vapours accumulated. Accordingly, all the regions east of this ridge are noted for excessive rains, heat, and thunder, while the western side enjoys a mild and clear sky, fanned by the winds, which, though we call them south-west, are truly, in their nature and effects, the north-west, or *boreas*, of the southern hemisphere. They come from the antarctic regions, and their dryness is itself a proof that no land is to be found in this quarter, but that all is ice.

This wind, which also buffets the Andes, contributes its opposition to the course of the winds from the east. Thus, it is observed by a late historian of Chili, Molina, that easterly winds are so rare, that only one storm from that quarter is on record, namely in 1633. The two adverse currents, when they meet, must rise together into the higher regions, where they are condensed, and, no doubt, changing their directions, slide off, or descend again into the middle or lower regions.

The sun, recrossing the line, and advancing to the zenith of Cuba and the Gulph of Mexico, creates a suction in the atmosphere of North America, which draws the trade wind to that side; and this is effected the more easily, as the attractive force of the South American focus is for that time suspended. Hence, after the solstice, the easterly winds advance as far as 30° or 32°, north, to the borders of Georgia, and almost of the Carolinas; and hence the general tendency, as related above, of the secondary winds to-

wards the frigid zone. And thus it it manifest, that the sun is the chief, if not the sole regulator of the winds. Its influence may be traced in their greatest irregularities, and the singular succession of the American seasons, derived wholly from the winds, is only a new example of the sun's power.

It is very strange, that where the cold is so severe, the winter should commence so late. With us, in latitude 45°, and even 42°, October is scarcely half gone, before we have daily rains, fogs, and frosts, for four or five months. In America, winter does not properly commence, even in the northern states, till the middle of December; and there are always three or four grand efforts, as it were, before the northerly winds gain a final conquest over the southern ones, and thus accomplish a thorough and lasting change in the temperature.

The first of these efforts regularly takes place about the autumnal equinox, in the ten days preceding or following, with a strong gale, somewhere between north-east and north-west, occasioned, as before-mentioned, by the rushing in of the northern atmosphere into the spaces quitted by the sun. This gale may be termed the first wave of the great semi-annual tide of the aerial ocean, and it brings along with it the rain it had taken up from the surface of the ocean over which it swept.

The first coolness of the season arises from the evaporation of these rains, which is followed by the earliest frosts, beginning at the line of the Patapsco

in the maritime country, and from the Ohio in the western districts. These frosts do not show themselves in the plains south of the Potowmack and Ohio; north of these rivers, and in the mountains, they ripen the maize, by opening the husk, and thus exposing the grains to the sun. The equilibrium of the atmosphere is soon re-established; the west and south-west blow again, and bring back all the heats of summer: and hence the periodical appearance and occasional violence of *fall fevers*.

About the middle of October, when the sun is 20° or 25° south of the line, a second change takes place: another gale chills us from the northern quarter, as if some particular position of the sun again disturbed the equilibrium of the air; and its rays, being now vertical to the eastermost coast of South America, appear suddenly to bend the great stream of the trade wind to spread along the coast of Brazil, the slope of which is favourable to a quicker diffusion. Now ensue fresh rains, fresh evaporation, and new frosts, which extend themselves as far as Georgia. Winter now appears confirmed in the possession of the whole country: the foliage begins to wither and fall; their lively green fades into violet, dull spotted red, pale yellow, and lastly into rusty brown; and these hues impart to the autumnal landscape in America a magic splendour, entirely unknown in those of Europe*.

* At this season, the most curious and enchanting spectacle in all the forest is the hiccory. This is a shapely and compact tree, crowded with leaves, most of which entirely change their hue

The north-west and north-east become now more frequent; the south-west slackens its efforts, and declines towards the west; the air is colder, but the sky is still clear. The sun is only hot at noon, and a series of fine days are expected near November, which is called the Indian summer. In France, an interval like this is termed St. Martin's summer, and in England All-hallown summer*; but it is rare, and so brief with us, at present, that we only know it traditionally.

A third more formidable effort is made about the close of November. Rains and frosts multiply upon us, the leaves fall, the north-western gales whistle with a keener and stronger blast among the naked branches, but fogs do not overshadow the earth as with us. The sky, especially in the north, is clear. November and a part of December are a series of alternate frosts and thaws. In the middle of December frosts and snows come on in Vermont, Maine, and New Hampshire, and gradually extend southward to the high lands of New York. In January a thaw usually occurs, succeeded by extreme cold. The deep-

into a very bright yellow, before they fall. When thus clothed, it suggests to the eye the appearance of a gigantic flower. The gradual and partial changes in the leaves exhibit all the varieties of green and yellow successively, and at the same time, in the same and in different leaves.—TRANS.

* Its American name it probably owes to its being predicted by the natives to the first emigrants, who took the early frosts as the signal of winter.—TRANS.

est snow and severest cold occur in February. The progress of the season is similar, except as to the degree of temperature, in Pennsylvania, Maryland, and Virginia. According to Ramsay, the frost kills the orange tree, even in February, in Carolina : because the north-west is apt to revive with unusual violence, after a few moist warm days.

March, when the vernal equinox is at hand, is usually bleak and stormy, with falls of snow from the north-east or north-west. The sun's return towards the northern tropic might be expected to bring back hot weather, but the prevalence of north-east winds, the long previous reign of the north-west, more impetuous than ever, and the coldness which the earth has acquired from its influence, retards vegetation so much, that the ground is as bare and desolate throughout April as in March.

It is not till May, even in the latitudes 36° and 37°, that the forest becomes green ; a delay the more surprising, as the sun's rays are unsufferably hot towards the last of April, and the difference in seasons between Virginia and Canada is not more than ten days, for the leaves are unfolded at Quebec by the 15th of May, only 25 days after *breaking-up**. The change is so great, that it seems as if a carpet of verdure was suddenly spread out on a floor 800 miles in extent.

* For several years, at Paris, I have noticed that the horse-chesnut in the Thuilleries shows its first leaves between the 24th of March and the 5th of April, while the oaks in the forests display their foliage a month later.

Hence it is that, as travellers have often observed, the United States knows no spring; the transition is immediate from severe cold to scorching heat, and the incongruous assemblage is constantly seen, of a freezing wind and a burning sun; a wintry landscape and a summer sky.

When, at length, vegetation receives a start, its progress is extremely rapid. Blossoms are quickly followed by fruit, and fruit reaches maturity much more speedily than with us. When the sun approaches nearest to the zenith of the continent, and diffuses its greatest heat, the northern blasts are completely overcome by the southern and south-western. June is accompanied with the most intense heats. July, more settled heats, and storms. August and September produce the most unwholesome and oppressive fervours, because the air is then subject to dead calms. If at this period there be three weeks of drought, the heat is so great, as we are assured by Belknap, Rush, and others, that spontaneous fires take place in the woods and marshes*.

* Some substances, such as powdered charcoal, with iron filings and sulphur, linseed oil, lamp-black, and the like, are liable, in certain dgrees of heat and moisture, to spontaneous combustion. If such substances occur in swamps, they are doubtless liable to be self-kindled. The fires in the forests of America are not spontaneous, or, if they were, they argue not excess of heat. When kindled by accident, their continuance and diffusion imply dryness; but, for obvious reasons, they would rage more in dry cold, than in dry hot weather.—Trans.

This spontaneous ignition is incomprehensible to me, and, till demonstrated by facts, I shall be disposed to attribute these fires to lightning, or to the negligence of woodmen or travellers.

At length the autumnal equinox returns, and the series of phenomena already described is repeated, with certain variations indeed, but with perceptible uniformity. Time is sure to bring back the north-east and north-west winds, whence the air chiefly derives its coldness. Afterwards, it revives the summer gales of the south and south-west, the great dispensers of tempests and heat. The transition is invariable, from heat to cold, by means of westerly winds, in autumn, which is the evening of the year, and from cold to heat by easterly winds, in spring, which is the morning of the great annual day. Thus these winds successively dispense four months of heat, five or six of cold and storm, and only two or three of temperate weather.

An opinion has, of late years, gained ground in the United States, that partial changes have taken place in the climate of the country, which have shown themselves in proportion as the land has been cleared. "Throughout Canada," says Liancourt, "it is observed, that the summer heats are longer and more fervent, and the winter cold more temperate and transitory, than they used to be." The same is mentioned by Kalm, as early as 1749.

In 1690 Lahontan writes, "I am leaving Quebec, and I set sail on the 20th of November, a thing never

heard of before." I have already related that, a century ago, marine insurances were always conditioned for sailing from the river St Laurence on the 11th of November, but now the term is extended to Christmas day.

Williams, the historian of Vermont, quotes several facts in proof of a material change. "When our ancestors," says he, "came to New England, the weather and seasons were uniform and regular; the winter set in about the end of November, and continued till the middle of February. During this period, a cold, dry, and clear atmosphere prevailed, with scarcely any interruption. Winter ended with February, and spring came suddenly upon us, without those fluctuations from cold to heat, and from heat to cold, which we experience at present. Summer was extremely hot while it lasted, but it was generally limited to six weeks. Autumn and September began together, and the harvest was stored before the end of that month. The scene has greatly changed since that time, in the cultivated part of the country: the seasons are different, the weather more variable, the winter become shorter, and interrupted by great and sudden thaws. Spring is a scene of continual vicissitude, and these changes of temperature are extremely hurtful to vegetation. Summer is not so hot, but it lasts longer. Autumn is most tardy in beginning and ending, and the harvest is scarcely finished before the second week in November: nor does winter become settled and severe before the end

of December." Such is the picture of the northern states.

The same alterations have been traced by Dr. Rush* in the climate of Pennsylvania. He believes, from the accounts transmitted down from the early colonists, that a material change has taken place in this respect: that the springs are colder, and the autumns milder, than formerly, so that cattle are housed a month later than they used to be: rivers freeze later in the year, and are earlier in their breaking up, &c.

Mr. Jefferson has likewise noticed a change in the climate of Virginia. He says, that even in the memory of the middle aged, both the heats and colds have greatly moderated. Snows are neither so heavy nor so frequent.

I have collected similar testimonies, in the whole course of my journies, in the western as well as through the maritime country. On the Ohio, at Gallipolis, Washington (Kentucky), Frankfort, Lexington, Cincinnati, Louisville, Niagara, Albany, every where the same changes have been mentioned and insisted on. Longer summers, later autumns, shorter winters, lighter and less lasting snows, and colds less violent, were talked of by every body; and these changes have been always described, in the newly settled districts, not as gradual and slow, but

* See various papers by him in the American Museum, vols. VI and VII, and a memoir on the climate of New York, in vol. VII, to the same purpose.

as quick and sudden, in proportion to the extent of cultivation.

There seems, therefore, no room to doubt the truth of a sensible change in the climate of the country. Dr. Rush, indeed, seems to hesitate in his belief, after noticing the severity of several late winters, and thinks some errors may have arisen from the want of thermometers: but these doubts must vanish before so great a multitude of witnesses, and of known facts. The causes of this revolution may be assigned with sufficient probability. Mr. Williams' reasonings on this subject are built upon plain and intelligible facts, and we cannot but agree with him in ascribing this change to the clearing of the ground.

He assures us, that in every district where the trees are felled, the air and the earth experience great changes in their temperature, in the course of two or three years. The settler has scarcely removed a few acres of forest, before the ground, exposed to the sun's rays, acquires, for a foot deep, a heat 10 or 12 degrees greater than the ground still covered with trees.

He forms this estimate from some experiments expressly made for the purpose. Two thermometers, sunk a foot deep into the earth, one in an open field, and the other in the adjoining forest, even before the leaves were out, gave the following results:

Date of observation	Heat in the field	In the forest	Difference
May 23	52°	46°	6°
28	57	48	9
June 15	64	51	13
27	62	51	11
July 16	62	51	11
30	65	55	10
Aug. 15	68	58	10
31	59½	55	4½
Sept. 15	59½	55	4½
Oct. 1	59½	55	4½
15	49	49	0
Nov. 1	43	43	0
16	43½	43½	0

From these observations it appears, that in winter the earth, whether naked or shaded, has the same temperature, but in summer there is a difference greater as the temperature of the air is higher. This agrees with the statements of Umphraville, who says, that at Hudson's Bay the ground thaws to the depth of four feet in open places, but only two feet in the woods. So Belknap informs us, that in New Hampshire the snow vanishes from the open grounds in April, the noon-day sun, unobstructed, being then sufficiently powerful to melt it, but continues still under trees, though leafless, the branches and trunks affording some shade: and this corroborates the repre-

sentations of Mr. Williams, as to the duration and severity of ancient winters, and their deeper snows.

Mr. Williams proceeds to observe, that the 10 degrees of heat added to the open ground must sensibly affect the atmosphere; and we may add, that the air thus heated must rise upward, and make room for a side wind from the woods, which, being heated and raised in its turn, must diffuse a warm air far beyond the precincts of the field.

"Clearing the ground augments the evaporation, and thus dries the surface, as is daily noticed in all parts of the United States, where brooks are continually drying up, and swamps changing into dry ground," which is a new reason for the encrease of heat in the general atmosphere.

"Clearing the ground evidently diminishes the quantity and duration of the snows. Within a century, snow covered New England for three months together, that is, from the beginning of December to the beginning of March. So they do still in the uncleared grounds, while in the cultivated parts they are neither so deep nor so permanent.

"There is a striking change in the winds. The western winds decline daily, while those from the eastward are continually increasing, and extend further than formerly. Fifty years ago they scarcely reached forty miles from the sea shore, whereas they are now felt, in spring, twenty miles further, nay even at the foot of the inland mountains, which are

seventy or eighty miles from the sea. It is plain too that they extend exactly in proportion as the land is divested of wood." This follows from the open ground being more heated, and thus the atmosphere above more easily admitting the air of the Atlantic.

Mr. Jefferson describes the same thing as taking place in Virginia. "The eastern and south-eastern breezes come on generally in the afternoon. They have advanced into the country very perceptibly within the memory of many persons now living. They formerly did not penetrate far beyond Williamsburg, but are now frequent at Richmond, and now and then reach the mountains. They deposit most of their moisture before they get thus far. As the lands become more cleared, it is probable they will extend still farther westward."

This extensive change of climate must, therefore, be ascribed to two causes. First, to the clearing of the ground, and thus producing a mass of warm air, which is constantly increasing. Secondly, to the access of warm winds, through these openings, by which the country is dried more rapidly, and the atmosphere more heated.

The same thing now happens in America, which formerly took place in Europe, and probably in Asia, and every where in the old world, history representing the climate of all countries as colder formerly than at present. Horace and Juvenal mention the annual freezing of the Tyber, which is now a stranger to ice. Ovid's picture of the Thracian Bosphorus has no re-

semblance to its present condition. Dacia, Pannonia, the Tauric Chersonese, and even Macedon, are described as in a state similar to Moscow in our times; yet now the olive thrives in these countries, and the vine is common. France, in the days of Cæsar and Julian, was distinguished for its frozen rivers, where ice served as bridges in the winter, but this is now rare, and when it happens is of short duration*.

I cannot, however, believe with Mr. Williams, that the colds have much diminished, in degree, in the course of the last century. The cold of 1633 was, according to him, greater than that of 1782, was attended with similar circumstances, and was the greatest ever known; but this estimate is merely conjectural, and his reasonings cannot supply the want of thermometrical observations at the former of these periods. Thermometers, indeed, were unknown in America till about the year 1740. This conjecture is the less plausible, if we admit, what I think I have proved, that the north-west wind is the great source of cold in North America, since this wind has undergone no alteration in its properties†. The experi-

* If any change of seasons or wind has been experienced in France, within the last ten years, we may venture to ascribe it to the great destruction of the forests, which the revolutionary times occasioned, and which has disturbed the equipoise and changed the course of the aerial currents.

† Though the state of the countries beyond the lakes is unaltered, yet this wind cannot fail to be warmed by blowing over dry and open fields on this side of them. If the summer winds can

ments of Dr. Ramsay afford analogies that will justify us in dissenting from this theory. This writer, on comparing the observations of Dr. Chalmers, made between 1750 and 1760, with his own, made from 1790 to 1794, found a difference of only half a degree in the heat, a difference so small, that it may reasonably be ascribed to a difference in the instruments: but if the heat has not encreased, we are obliged to infer, that the cold has not diminished. What appears to be demonstrated, on this head, is, that winter is shorter, the summer longer, and the autumn later, than they formerly were, but that the cold, as the last ten years sufficiently evince, is as violent as ever.

Mr. Mackenzie, who admits these changes, supposes the cause to be inherent in the globe itself, because he has witnessed them in places where the ground remains in its primitive state. But if these places, which he does not mention, be in Canada, they tend only to confirm my supposition, since the removal of forests, in certain mountains and slopes of Genessee and Kentucky, would unavoidably introduce considerable streams of mild air into Upper and Lower Canada, from the south-west. These aerial currents have never yet been sufficiently attended to,

derive any warmth from, or impart any to, cleared ground, the north-west, in blowing over these spaces, must be somewhat influenced, and must arrive on the borders of the Chesapeake somewhat differently modified from what it would be, were all the northern states covered with forest.—TRANS.

but experience will prove, that their influence is very extensive over the general and local temperature*. It is quite possible, however, though nobody certainly knows, that other causes may produce the appearances we witness.

It still remains a question, whether these changes are real improvements in the climate of America; and this point is almost settled by Mr. Williams, in the comparison he draws between ancient and present times, though in a manner unfavourable to the latter. The experience of physicians unfortunately confirms his conclusions. Dr. Rush, whose enquiries have been extensive and exact, informs us, that bilious fevers have every where followed the cutting down of the woods, the clearing of lands, and the drying of swamps. That the culture of several years is required to mitigate or extirpate them. That pleurisies and other inflammatory diseases, which were formerly almost the only ones known, have grown much less common, which proves an evident alteration in the purity of the air.

These ideas on the influence of woods, and of ground newly cultivated, are familiarly known; but a more particular detail of the evils connected with the American climate may be of some use in pointing out the means of prevention, and I shall now therefore proceed to give it.

* It is to these that the thunder and hail storms are owing, by which certain districts are infested, while the country a mile or two off is exempted from them.

CHAPTER X.

Of the reigning Diseases in the United States.

EXCLUSIVE of maladies common to all countries, there appears to me to be four diseases, whose prevalence entitle them to be considered as the direct offspring of the soil and climate of this country.

The first of these are coughs, catarrhs, and all those complaints arising from obstructed perspiration. Colds may be reckoned the endemic of the United States. They are rife at all seasons, though most so in winter, and about the vernal equinox. They are evidently produced by the sudden changes in the temperature, so characteristic of the climate. Women are more subject to colds than men, plainly because their recluse and sedentary life makes their constitutions more delicate, and their dress is thin and light. The French fashions have already reached America. Even in the fury of their revolution, nothing was current with this people, but what was stamped by the practice and example of England. I found the

Parisian dress of 1793 in full vogue at Philadelphia in 1795, and that of 1794 did not reach that city till 1796. Enquiring into their history, for the intermediate years, I discovered that they were obliged to pass over to London, before they could meet with a kind reception in America.

In the maritime towns, where the emulation of European modes is more eager and servile, colds frequently arise from overheated rooms, balls, tea parties, and feather beds*. Habitual or repeated coughs are sufficiently weakening to the lungs, and these are the necessary consequences of repeated colds. People of fashion will sometimes have four or five severe colds in a winter, for the rich are particularly subject to them. Hence it is that, in a few years, the lungs become incurably distempered, and the miserable victim is carried off by a rapid or lingering consumption.

All travellers in America speak of the prevalence of this disease, which is chiefly fatal to young married women, and females in the bloom of youth. It prevails least in the southern and western states, the reason of which is truly assigned by Dr. Currie of Liverpool†. He tells us, that in Carolina and Virginia the warmth of the air gives a determination to the skin, and carries off through its pores all morbific humours, and the crudities of indigestion, themselves the reciprocal causes and effects of colds: whereas,

* Among the German colonists the fashion is to sleep *on* a a feather bed, and *under* a down one.—Trans.

† American Museum, vol. V.

in the middle and northern states, the cold moist atmosphere shuts up the pores of the skin, and imprisons in the body all those evil humours, which, in searching for an issue, are sure to fasten on the weakest parts or organs*.

There is reason to believe that the taking cold is facilitated by the use of very hot tea, which the people are accustomed to drink. I observed, not only in them, but myself, that the moisture it excites on the skin renders it more susceptible of cold, and that

* My own experience, on my return from Egypt, confirms these remarks. At Cairo, I drank five or six dishes of coffee daily, without inconvenience, but at Paris, where I passed a sedentary life, I could not drink a single dish fasting, by the month of October, without nervous and feverish sensations; I may likewise add, that during three years which I spent in Syria and Egypt, I had no disease but the influenza once, in 1783, whereas, in the United States, during a similar period of three years, I was twice severely attacked with malignant fever, I had five or six violent colds, and a rheumatic affection, that has proved incurable. Yet in both countries I equally conformed to the regimen of the natives.—V. A conformity to the American regimen was the most effectual method of shortening and destroying life that our author could have adopted. An infinite proportion of the diseases which exist in the world are owing to absurd modes and vicious habits, and the dress and diet of Europe are assidiously copied in America, where it is far more injurious, from the nature of the climate. The great curse of the country, and the source of ninety-nine hundredths of the maladies which ravage it, is the abuse of spirituous liquors. If the influence of evil moral and pernicious physical habits were subtracted from the causes of disease, the climate would be next to nothing.—Trans.

I have often caught cold on going out after a breakfast of tea, in cool weather*. I was assured that, in my case, these ill effects were owing to my not being accustomed to it, but the effects, though less conspicuous in those whom habit has inured to it, cannot be less real. Indeed, the whole system of American diet is directly hostile to health, and productive of habitual indigestions, which are extremely favourable to taking cold. Since pulmonary affections are derived chiefly from colds, and these proceed from the sudden and violent changes of the temperature, phthisis may be considered as the characteristic of this climate.

2. Travellers equally agree as to the prevalence of defluxions on the gums, and of the early decay of teeth. You will scarcely find, among ten persons under thirty, one whose teeth are entirely sound; and it is a cause of particular regret, that young and beautiful women, between fifteen and twenty, have generally their teeth disfigured with black spots, and the greater part of them gone. There are many opinions as to the cause of this general ruin. Some physicians ascribe it to the use of salt meat, which is, indeed,

* Volney's case is certainly a singular one. Among the causes of *colds*, this would not have readily occurred to common observers. The remark, though probably fallacious in all cases (since hot drink will hardly produce immediate perspiration, except in very hot weather, when it can do no harm in *this* way); is far more applicable to the English, with whom tea, boiling hot, is far more common and general than with any other people.—TRANS.

universal, some to the use of tea, and the excessive use of sweet things. Dr. Kalm, comparing the diet of different nations and classes of society, seems to have lighted on the true cause. He thinks tea injurious to the teeth, not by its own intrinsic properties, but merely as a *hot* liquor. Experience, indeed, has long since informed us, that every hot liquor produces a sensibility in the teeth, which shows itself afterwards when coming into contact with any thing cold. The enamel, or exterior hard coat, becomes soft, and hastens to dissolution. Hence the general complaint of bad teeth in the north of Europe, for in all cold countries hot liquors impart agreeable sensations to the whole frame, while cold drinks are most agreeable in hot countries; and it is remarkable that in the latter, as in Africa, Arabia, and India, the teeth are generally fair and sound.

This conclusion acquires some force from a fact observed, within the last twenty years, in the United States. Before that time, bad teeth were never found in an Indian, and the food of these tribes is commonly cold. Some few individuals, particularly women, of the Oneida, Seneca, and Tuscorora tribes, having adopted the use of tea, their teeth began, in the course of three years, visibly to decay. Bougainville also tells us, that the wretched savages of Terra del Fuego have all bad teeth, and that they live almost wholly on shell-fish, roasted and eaten *burning hot**.

* Volney seems to have adopted erroneous ideas as to the use of tea in America. This, or any other foreign infusion, is far

Salt meat may, however, be admitted as an auxiliary cause: it is certain that the scurvy, a disease particularly hostile to the teeth and gums, is the consequence of the excessive use of salted meat. A tainted breath is one of the symptoms and concomitants of scurvy as well as of bad teeth; hence we may conclude, that salt meat, the digestion and imperfect chyle of which conveys impure exhalations to the lungs, is the primary cause of *caries*, and that hot liquors contribute to the evil, directly by their influence on the teeth, and indirectly by debilitating and vitiating the digestive organs. This effect cannot be attributed to fresh meat, since the Tartars, the Indians of America, and all carnivorous animals enjoy white and sound teeth. The blame cannot belong to the use of sugar and other sweets, because the Africans and Hindoos, who delight in the sugar cane and in sacharine fruits, have good teeth, and because they are rather purified and cleansed by those acids, which are formed by heat, and which abound in hot climates. If these conclusions be just, how much is it incumbent on parents and physicians, in every country, to prohibit or discountenance the use of hot liquors and salt meats,

from being so general here as in Europe. Milk, either raw or boiled, is the usual drink, as a meal, in almost all country places; and as to the sensibility to *cold* being augmented by the use of *hot* liquids, this is a questionable point, since well water is in winter warm to the teeth as well as to the other organs of sensation, and painfully cold in summer, though the temperature is the same.—Trans.

especially in the young! Were this caution properly attended to, defluxions on the gums, arising from vicissitudes of temperature, and which are the secondary causes of the ruin of teeth, would seldom occur.

3. Autumnal intermittents prevail in this country to a degree scarcely credible, especially in newly cleared grounds, in the neighbourhood of rivers, pools, and marshes. In the autumn of 1796, in a journey of seven hundred miles, I scarcely found twenty houses free from agues and fevers. All the banks of the Ohio, a great part of Kentucky, the shores of Lake Erie, the Genessee country, and its lakes and rivers, are annually infested by them.

In a journey of 250 miles, from Cincinnati to Detroit, begun on the 8th of September, in a company of twenty-five persons, we did not encamp one night without one at least of the party being seized with a periodical fever. At Greenville, the head quarters of the army that had just conquered the country, three hundred persons, from among three hundred and seventy, were sick of fevers. On arriving at Detroit only three of our party were in health, and on the ensuing day, our commander major Swan and myself were both seized with a malignant fever. This fever annually visits the garrison at Miami Fort, where it has more than once assumed the form of yellow fever.

These periodical fevers are not immediately fatal, but they sensibly enfeeble the constitution and shorten life. Many others beside myself have observed,

that in the southern states a person is as old at fifty, as in Europe at sixty-five or seventy; and I have heard many Englishmen declare, that their friends, after a few years residence in the southern or even middle states, appeared as old again as they would have done in their native country. If these fevers seize their victim at the end of October, they are likely to continue all winter, and reduce him to a state of wretched languor and debility. Canada, and the adjacent cold countries are little subject to them. They prevail most in the low and level country, and more near the sea than among the hills. Hence we might suppose that a high situation would be generally preferred by settlers, but health is never allowed to enter into competition with profit, and the more fertile plains and hollows are therefore chosen, though at the expence of health, and the hazard of life. I have often attempted to reason with the farmer, on his own thrifty principles, thus: "The lowlands yield you forty bushels of Indian corn, or twenty bushels of wheat, an acre, whereas, you say, you can get but half that produce from the sides of the Kentucky and Virginian mountains. True: but in the plain you are sick half the year, and in the hills you are hale and strong to labour all the year round. So things are just equal, unless you remember that you are cheerful and alert in one case, and your Poor Richard says, that health is better than wealth; but in the valley you are sick, miserable, and spiritless the whole year."

"That is true," said a country clergyman in reply; "but you omit one important circumstance: that of having nothing to do, in the lowlands, for half the year."

My friend was in the right, for I have often heard it observed, that the maritime districts of Virginia, though extremely sickly, are still preferred by numbers to the mountainous and wholesome regions, because fish and oysters abound there, and a subsistence costs little or nothing*.

The favourite preventative of fevers in America is what is called bitters, of which the basis is some kind of wine or spirit, and this potion, whatever the reader may believe, is generally efficacious. I have known many families, among Virginian and Pennsylvanian farmers, in which those who drank beer or water were liable to agues, while the rest, who used spirituous liquors, perhaps to excess, were entirely exempt from them.

This opinion is likewise adopted in Holland, where tobacco and strong liquors are generally deemed antidotes to the unwholesome damps of the soil and climate. I have known two instances in which the draining and drying up of a small pool and rivulet has

* The true state of this case is, that men are every where reckless of health. In the choice of an abode, and their continuance in it, as well as in all other things, they do not regulate their conduct by any such considerations. Habit reconciles us to every thing, and a stupid confidence in our own good fortune possesses us.—TRANS.

completely freed a family from the annual visits of intermittent fevers.

During my abode in Corsica, in 1792, several facts of no small importance occurred, which were connected with this subject. Several posts in that island are annually annoyed with fevers: among others, the post of San Fiorenza, which is situated on the borders of a pestilential bog, of about forty-five acres. Here, at the end of summer, and for a few weeks in autumn, these fevers assume a malignant cast, in consequence of the copious putrid exhalations set loose by the intense heat of the sun. The whole garrison would entirely perish, if they were not relieved every two or three weeks. The French physicians, after the trial of many remedies, at length observed, that only two posts in the whole island were entirely exempted from this pest. These were Vivario and Vitzavona, and their peculiar salubrity was discovered, as is usual in such cases, only by chance. A Swiss officer, who fell dangerously sick at San Fiorenza, desired to be removed to his own regiment, a part of which happened to be stationed at Vivario, and here, in a fortnight, he was restored to perfect health. This experiment being made on some other sick soldiers, it was crowned with such success, that thenceforth it became the custom to send thither, as to an hospital, all desperate cases of fever, and the disease is always found to yield to the sanative properties of the air, in the course of never more than eleven days.

Now these two posts have a situation widely different from all the others. They are remote from any stagnant water, and hang like eagles' nests, on the sides of the ridge which divides the whole island into two parts. They are about 6900 feet above the sea, and the atmosphere around them more nearly resembles that of Norway or the middle Alps, than that of the rest of the island. The temperature never rises to 70 degrees but in the three summer months. For three or four months they are buried in snow, by which all communication with the neighbouring districts is sometimes cut off, for eight or ten weeks together. The wind is always blowing, and generally hard, as they occupy two ends of a narrow pass across the rocky summit of the mountains, which in other places is almost impassable.

Vitzavona, on the western side, is somewhat damper, and therefore less healthy. Till 1793, these posts were garrisoned by Grisons, fifteen or twenty soldiers being allotted to each, because the air and situation, though dreary and desolate, were such as they had been accustomed to. Their diet, especially in winter, was salt meat, sour crout, and a poor kind of beer or wine, and generally biscuit. There was scarcely room about the fort to walk, and in winter they were often imprisoned within doors a fortnight together, by the storms that raged without. Their life, indeed, was more like that of men on shipboard than on land. I have myself visited these lofty abodes, and speak of them, therefore, from my own

knowledge. The malady most incident to the garrison is pleurisy.

Their health cannot be ascribed to their diet, because, in the low country, this food would generate ague and scurvy. It can only be attributed to the air, which, at this height, is light, pure, and cool, while the atmosphere of the coast is loaded with heat, damp, and every pernicious exhalation.

Hence the simple mode of cure is to breathe a pure and elastic air. This is generally, though not always, found in lofty situations, in our climates; for there are places in France high and airy, but still unwholesome, in consequence of lying to the leeward of pools or marshes: and this is still more common in hot countries. There are heights in Corsica and Italy wholly uninhabitable, because, though far remote from damp and boggy places, they lie in the course of the winds that usually blow from them. Such is the case in Bengal, where there are woody eminences, infested, in spite of their flattering appearances, with what is there termed the *hill fever*. It will hardly be supposed, with such a name, that it is no more than the malady of low lands and bogs: it is however the same, produced not only by the damps that gather, during the monsoons, under these immense woods, but by the vapours which rise from the subject plains, and are wafted hither and entangled among these summits. To render lofty situations healthy, they must be dry, cool, and inaccessible to noxious winds.

The want of such a natural atmosphere may perhaps be supplied by some process of art, by which it may be manufactured, and by which noxious vapours may be neutralized. Chemistry has made many discoveries, in this respect, of late years, and more may be expected from the zeal with which that science continues to be prosecuted. It is found that the common air contains, as one of its ingredients, a vital or respirable fluid called oxygene, and that air is pure and healthful, according to the relative quantity of this ingredient. Lavoisier ascertained that the proportion in common air is about one fourth; Berthollet made it somewhat less: but they may both have been exact in their experiments, as air, in different situations, may well be supposed to differ in this particular. It probably varies in different countries, and to ascertain these differences, at different places, in different climates, and at different heights above the surface of the earth, would probably be highly useful. The cold dry air of Siberia might be compared with the sultry moisture of Porto Bello and Guiana, or the dry heat of Zaara and Kedjas, and balloons might be of use in examining the different strata of the atmosphere. At present it seems certain, that, in the temperate zone, the air of high places is purer, because it contains more oxygen, and fewer terrestrial exhalations. At Vivario and Vitzavona, indeed, the specific gravity of the air is somewhat less than that of oxygen, but it must necessarily accumu-

late there, when driven by the vapours from the sultry coast.

It has lately appeared, that oxygenated muriatic acid gas will separate common air from its infectious and noxious properties or vapours, and were this alone sufficient for the preservation of health, we should be fortunate in possessing such simple means : but much remains to be known concerning the various kinds of poisonous fluids that float in the atmosphere. Some of these are so subtle, that no instrument has hitherto diluted or seized them. Considering their effects on the human constitution, they may be deemed poisons, which act sometimes on the nervous and sometimes on the sanguineous fluid, producing a fermentation in the mass, in the manner of leaven. Different known gasses, like the oxygenated muriatic, act upon life silently and suddenly, not merely through the lungs, but through the pores of the skin, and many unknown gasses may possess the same power*.

To the action of such fluids must be traced those epidemics which prevail in certain countries, and in certain states of the weather. Fevers accompanied with shivering, and with alternate increase and decrease, have, in their periodical returns, something analogous to the great functions of hunger and sleep, and may therefore suggest a belief, that the source of

* In what immediately follows, I have been puzzled to extract a clear and distinct meaning from Volney's obscure and verbose phraseology.—Trans.

the disease is rather in the nervous system, than in the stomach or blood. The sudden appearance of fever, on exposure to the sun, to wet, or to extremes of cold and heat, may be owing to the action of some gazeous principle on the fluid which pervades the nerves; especially since these effects are chiefly experienced in places liable to great vicissitudes of heat and cold; since perspiration always bespeaks a contraction of the nerves, and febrile paroxysms usually terminate in perspiration. My opinion will acquire new strength, and we shall thus be supplied with a plain and satisfactory theory of contagion, when we recollect that the lungs and nostrils bring a great body of nerves into contact with the external respirable air, and that internal medicines are much less beneficial in those cases than a change of residence, like that from the coast of Corsica to Vitzavona and Vivario.

4. OF THE YELLOW FEVER.

The yellow fever prevails more and more in the United States*, and its importance will justify me in discussing it at some length. Having received a medical education in early life, I have been the more qualified to reason with physicians upon this disorder,

* The *encrease* of yellow fever is questionable.—TRANS.

and to compare the facts that relate to it, though I hope I have done this with a diffidence proportioned to my imperfect knowledge of this science. Without some such smattering, I should not have meddled with this subject, for it is easier to discuss the topics of the mathematical sciences without any direct knowledge of them, since their principles are determinate and precise, than of medicine, so irregular and complex, so liable to the varying influence of circumstances, and which requires so much perseverance, industry, and sagacity.

The silly and dogmatic part of mankind are constantly exclaiming, that all is chance and guess-work in medicine, while they, at the same time, acknowledge themselves profoundly ignorant of the subject, and whenever the slightest ailment betides them, they are eager to call in some neighbouring Galen, or, if none be at hand, they implicitly trust to the skill of some old woman, whom experience has made a physician, or some empiric, in whom impudence or plausibility supply the place of experience. But this is a digression, from which it is time to return.

This disease owes its name to the deep lemon colour, which, in the dissolution of the humours, first shows itself in the eye, and afterwards spreads itself all over the body. The French call it the Siam fever or disease, either because it is supposed to have originally come from Siam, or because the hue of the patient resembles the complexion of the Siamese.

The Spaniards term it the black vomit, from one of its most usual and most dreadful symptoms. Its ordinary history is this :

Some days preceding the attack, there is a general languor and lassitude, dull pains, drowsiness, and sometimes stupor. These are followed by intense head-ache in the brows, by acute pain in the back, arms, and legs, and alternate heat and cold. The skin is dry, parched, and has frequently spots, that are at first reddish, and then violet coloured. The eyes are dead, ghastly, and blood-shotten. Respiration is difficult, accompanied with frequent sighs, and the air from the lungs is burning hot. The pulse varies with the constitution of the patient, and according to other circumstances ; in general it is hard, quick, and irregular, but the danger is greatest when it resembles the natural or ordinary state. Fainting and deafness, at the commencement of the malady, are very formidable symptoms. A tormenting thirst, with an inflamed tongue, which afterwards becomes black and furred, and at length fetid, are all signs of this disease. The sick complain of burning heat in the stomach. The vomitings from slimy change to the most corrosive acid, sometimes unaccompanied with bile, but oftener attended with that fluid, which is of a yellowish green colour, and end in a blackish matter, like dregs of ink, or coffee grounds, with a smell of rotten eggs, and so acrid that the throat is scalded by it. Sometimes constipation takes place, and sometimes a blackish diarrhœa.

The disease has now passed through the inflammatory stage, and the fluids all tend to dissolution. The fever visibly abates: but this arises from the rapid decline of the vital energy; the pulse becomes weak and tremulous; the victim is restless, and sometimes delirious: *Dire is the tossing; deep the groans.* Life gradually sinks under the continued and excessive vomiting and stools: and the most fearful presage is an inclination to lie on the back, draw up the knees, and slide down to the foot of the bed. The eyes and the whole body become yellow, and the dissolution of the fluids is complete. If the lancet has been previously used, the orifice bleeds afresh. The solids are now attacked by spacelus and gangrene, and death hastens to close the scene.

This disease has been long known in the hot and damp regions of South America, and the West Indian isles. Cases have always been common at Carthagena, Porto Bello, and Vera Cruz, upon the continent; and in the isles of Jamaica, St. Lucia, St. Domingo, and Martinique. Louisiana, and the southern coasts of the United States, where heat and moisture combine their pestilential influence, were never strangers to it. New Orleans, Pensacola, Savannah, Charleston, and Norfolk were seldom free from it for five years together. The Potowmack appears to have been its boundary, for in the earlier part of the last century there are only two periods mentioned, 1740 and 1762, in which it appeared north of that river, the first time at New York, and

the second time at Philadelphia* ; but since the year 1790 its visits have been so frequent, that it may be now considered as congenial to the northern as well as to the southern states. Some scattered cases occurred at New York in 1790. It prevailed next year with more steadiness ; and traces were observed of it in 1792. In 1793 it appeared at Philadelphia as a pestilence, and it re-appeared, though slightly, in the two following years. It raged at New York in 1794 and 1796, and at Philadelphia in 1797 ; while, at the same time, it ravaged Baltimore, Norfolk, Charleston, and Newburyport. Some tokens of it were perceived at Sheffield and Boston. Other instances are also mentioned ; one at Harrisburg, in 1793, another at Baltimore, and a third at Oneida, in Genessee : to which may be added, several cases in the Miami of Lake Erie. In 1798 it raged with greater malignity than ever at New York and Philadelphia.

The American physicians, this disease being new to them, had to invent a cure. Unfortunately, most of them imagined they had found the remedy in the doctrines of Brown, who was extremely popular among the faculty of the United States. The simplicity of this system, which explains every thing by two states of direct and indirect debility, and the subtraction or addition of stimuli, direct and indirect, captivated

* It raged at the beginning of the century, at Philadelphia.—Trans.

the more, because it was dogmatical, and superseded the tedious aids of observation and experience. Hence the ardent fancy of youth, and the indolent temper of all ages, embraced it with eagerness. Reasoning from these principles, they have constantly administered tonics at the beginning of the fever, deeming it necessary to raise the languid powers, when the true object should have been to slacken and depress the overstrained fibres. They likewise made use of the most drastic purgatives, with a view to expel the morbid humours, before these humours were duly and sufficiently concocted and matured.

This treatment particularly prevailed at Philadelphia, in the fatal year of 1793. It was there the fashion to give twenty or twenty-five grains of jalap, ten or fifteen of calomel, or even gamboge, and all these in repeated doses. For drink they prescribed camomile, mint, or cinnamon tea, and Madeira wine, sometimes to the amount of a bottle a day. Brandy is well known to form an ingredient of the purest Madeira. Besides, in the midst of summer, with the thermometer at 87 degrees, the sick were kept in close chambers, they lay on feather beds, with two or three blankets above them, and sometimes even with a fire in their rooms: all this for the purpose of forcing perspiration, which the inflammatory condition of the system pertinaciously refused.

Of this treatment the obvious consequences took place in a vast and rapid mortality: not two out of fifty of the sick recovered. They all showed symp-

toms of gangrenous suffocation, naturally flowing from a cherished inflammation. Terror overpowered every mind; the malady was regarded as pestilential, and all possibility of recovery from its attacks as hopeless. Some physicians, whose influence was considerable, sanctioned this opinion by their publications. The sick were deserted by their nearest relatives, and the desolate houses were full of noisome effluvia from the dead they contained. The government, at length, interposed for the removal and interment of the dead, and for conveying the sick to an hospital. Houses were marked with chalk, as in a time of proscription, and the terrified inhabitants fled for safety to the neighbouring villages, or encamped in the open fields, as if their city were in possession of an enemy.

At this sad moment, chance conducted hither, from the conflagrations of St. Domingo, Dr. Deveze, a French surgeon, of considerable eminence in that island. He happened to be called to a patient, and employing the remedies usual in the French islands, his great success soon attracted the notice of government, and he was placed at the head of the hospital at Bush-hill. His account of his method of treating the disease, published the ensuing year, is equally creditable to his skill and humanity, as it propagated new views upon the subject throughout the country. By this treatise it appears, that he divides the disorder into three stages, distinct from each other, though

they sometimes succeed each other so rapidly, that there is hardly time to note the progress.

The first is a state of extreme inflammation, combined with tension of the brain and spasms of the nerves, and requiring not tonics, but laxatives and sedatives.

The second is a state in which the fluids are dissolved, by the previous preternatural heat. These fluids are to be evacuated as soon as possible, since they are become noxious to the body that contains them; and here Art should stand by, watchful to aid and promote the crisis, but rather following Nature than stepping before her.

The third period is that of re-composition and convalescence, in which Art has only to prescribe the regimen, and inculcate caution and forbearance on the patient's appetites.

Agreeably to these notions, he began by drawing away some blood, if the patient were plethoric. He ordered diluents, acidulous aromatic drinks, and found great benefits to flow from liquids impregnated with carbonic acid. He adapted the drink to the patient's stomach, and took care to guard his imagination against the chimera of contagion, the reality of which he always persisted in denying. He liberally admitted fresh air, and took no pains to provoke sweating, which he thinks is rarely employed by Nature as the means of determining a crisis.

When he had, by these means, abated the fever, he proceeded, in the second stage of the disease, to

watch the approaching crisis, and to mark the form or organ to which it showed a determination. These efforts most commonly produced extensive suppurations, which he aided, by externally applying vesicatories and cataplasms, by the internal use of aromatic beverages, and even by weak wines, mixed with sugar and water; by gentle purgatives, and, lastly, by the *bark*. Opium, in such high credit with the physicians of the country, he considered as hurtful and improper.

We may naturally suppose, that a solitary stranger could not fail to meet with many obstacles; but truth and reason always make their way sure at last. The sick naturally preferred the man who performed the most cures, and his practice was finally adopted by many of the faculty.

Whether the change be owing to this excellent and seasonable publication, or to the natural progress of observation and experience, it is certain, that favourable changes began to take place, in the treatment of this disease, from this period. In 1794, several physicians of New York made use, as a purgative, of Glauber's and other salts, in conjunction with diluents. Madeira wine and other tonics were no longer lavishly used. They used the lancet with great caution. The warm bath and fomentations with vinegar were employed as sudorifics, and these were sometimes beneficial. From this moment a salutary schism broke out in the colleges; old ha-

bits were shaken, and new paths chalked out for the spirit of curiosity and enterprise.

This schism has been particularly violent on the question of the origin of this disease. Some maintain that it is always imported from abroad, especially from the West Indies; and rely much, for support to this opinion, on the unfrequency of this disease, anterior to the peace of 1783. Its subsequent prevalence they impute to the increased commercial intercourse with the West Indies and Spanish America, and even attempt to trace its admission to particular vessels, by which a contagious matter, not less virulent than that of the plague, has been indisputably imported.

The other party affirm, on the contrary, that this disease is capable of being generated within the country, by a concurrence of certain incidents of time and place. So far from admitting the historical arguments of their opponents, derived from the case of particular vessels, they clearly prove, that the ships accused were first infected with the malady after their arrival at New York or Philadelphia, and in consequence of lying near the places where the disease was peculiarly malignant. They even prove that those of the crew who were first seized were such as had greatest and earliest communication with the shore*.

* Thus the people of Philadelphia generally believed, for a time, that their pestilence of 1793 came from Grenada to them, but originally from Bulam, in Africa, in the ship Hankey. A physician of that island, Dr. Chisholm, supported the tale of im-

From an extensive and judicious view of all circumstances, these physicians have deduced and ascertained the following points in the history of this disease:

1. That it is to be found in large populous cities, more than in small towns, villages, or country places.

2. That in such cities, as New York, Philadelphia, Baltimore, it prefers those parts that are low, and abounding in filth or stagnant water; streets narrow and close, unpaved and dirty; and especially the wharves, and the nooks and alleys adjacent, which are covered with filth, and which is left dry and exposed to the sun by the ebbing of the tide. Mr. R. Bayley has calculated, that at least twenty-four loads of every kind of filth, including even the carcases of dogs, cats, and horses, were thrown, in one year, into the dock between Whitehall and the Coffee-house slip. Hence it was, that, in July, it produced so powerful a stench, especially in the evening, as to excite in those who resided in the neighbourhood nausea and vomiting.

portation by the Hankey, in a pamphlet. Three years after, Noah Webster and Dr. E. H. Smith, of New York, published a journal of the voyage of the Hankey, drawn up by a respectable eye-witness, which contains so candid and convincing a statement, that no reader can hesitate to believe that Dr. Chisholm was completely deceived. Dr. Bayley, likewise, in a judicious report to the governor of New York, proves that the stories current respecting the importation of the fever in the Antoinette and Patty were entirely groundless. See Medical Repository, vol. I, pages 459 and 121.

3. That it prevails only in July, August, and September, during which the great heats of the climate, which rise customarily to 86 or 88 degrees, produce a fermentation in these heaps of animal and vegetable matter, and extract from them gazeous fluids, equally noisome to the senses and hurtful to health. The epidemic is encreased by damp weather, by south-east and even by north-east winds, and is not abated by the plentiful rains of the south-west. That the disease was most apt to prevail when the summer was dryest and most calm, probably because in such state of the air the noxious vapours act more powerfully on the lungs, and through that medium on the whole system.

It appears, lastly, that those most liable to this disease are the poor, squalid inhabitants of low, wet, and neglected suburbs; workmen most exposed to the heat of fires, as smiths; and those addicted to spirituous liquors, a fit of drunkeness being not unfrequently succeeded by yellow fever; persons of sanguine, robust habits, adults, strangers from northern climates, *blacks*, and men enfeebled by vice and luxury: that, on the contrary, those are most exempt from it who are spare and temperate, cleanly in their habits, in easy circumstances, residing in clean, airy streets, and strangers from hot climates.

They have likewise proved, that even in the West Indies, Grenada, Martinique, St. Domingo, and Jamaica, which have sometimes been deemed the peculiar seats of the disorder, the same circumstances were necessary to concur to produce the evil; that

both in seasons, places, and constitutions, a direct analogy prevailed among the fevers of different countries; that islands like St. Kitts, St. Vincents, Tobago and Barbadoes, which are lofty and dry, are extremely healthy; whereas in Grenada it only appeared at St. Georges, and in Martinique at Fort Royal, in places near the shore, and in the neighbourhood of marshes, where vessels were crowded together in a very dry season; and finally, that if the disease came from abroad, into New York and Philadelphia, it would have been regularly imported from Norfolk and Charleston, with which they have always an extensive and unguarded intercourse, and where the combination of the above unfavourable circumstances make it almost annually endemic*.

* The argument drawn from the rare appearance of the fever in former times operates both ways, for as there is no essential or apparent difference in the internal condition of New York and Philadelphia, between former times and the present; or, if there be any difference, it is in favour of the wholesomeness of their present condition; so there is no material difference, or that difference is in our favour, between the commercial intercourse of these cities with the tropical islands and cities now and formerly. Why, exclaims one, did not the equal or greater filth and impurity of our towns generate the fever before 1790? and why, may another exclaim, did not our intercourse with the West Indies import that disease sooner? an intercourse more incautious and unguarded than at present. The rage for explaining every thing, and the dogmatic spirit that imagines the causes of every thing within our reach, is as prevalent now as in the darkest ages of the world.—Trans.

These conclusions are established in numerous tracts, published from 1794 to 1798, the year in which I left the country for Europe*.

After reading these works attentively, we cannot fail to be struck with the harmony and conformity between the prevalence of the yellow fever and the circumstances just mentioned. We every where find the disease appearing and advancing in obedience to these circumstances, and its virulence always bearing an exact proportion to the heat of the atmosphere, combined with dryness, or with temporary moisture; to the extent and vicinity of pools and bogs, and especially to the quantity of animal or vegetable matter, in a state of putrid fermentation. If there be heat, without marshes or animal putrefaction, fevers are generated of the inflammatory kind, unattended with peculiar malignity; if there be marshes without animal matters, the exhalations produce putrid sore throat, cholera morbus, and dysenteries; if animal putrefaction be connected with these circumstances, the nervous system appears to be

* See the Report of the Physicians to the Governor of Pennsylvania; of R. Bayley to the Governor of New York; on the Yellow Fever of New York, by V. Seaman; Dr. Rush's Enquiries and Observations; Dr. G. Davidson on the Yellow Fever at Martinico, in 1796; Origin of the Fever of Grenada in 1793 and 1794, by E. H. Smith; on the Bilious Malignant Fever, by S. Brown; on the Fever and Dysentery of Sheffield, by Dr. Buel; and the valuable Collection of Letters, on the Fevers of various places, published by Noah Webster.

affected with a kind of poison. Fevers may be thus measured, as to their malignity, by the degrees of the thermometer, combined with the force of putrid exhalations, so that, in the course of the same season, we may count up all their degrees, from mere synocha to the consummation of every malignant operation in the *plague*. Hence it is evident that every country, which contains and unites these enemies to life, may engender, in its own bosom, all these diseases.

I imagined, very early, that the heat necessary to produce malignant fevers, in Syria and Egypt, was about 86 degrees; and it was with no small satisfaction I afterwards found the same opinion, suggested by similar facts, in Dr. Davidson of Martinico, who thinks that, beginning at this degree of 86, the malignant and contagious properties of fevers keep pace with the encrease of temperature, till they terminate in the plague.

These notions on the origin and causes of the yellow fever are now so prevalent in America, that a great majority of their physicians concur in believing it to originate within the country. The college of Philadelphia is the only learned body that continues to maintain its foreign origin; and this opinion, which was the earliest, will never want numerous partisans, from the following powerful considerations:

Because it is flattering to national vanity, and, we may add, timidity.

Because it favours the schemes of land-jobbers, and removes the obstacle and discouragement to emi-

gration, raised by the opposite opinion. The case, indeed, is pretty much the same, if its importation be so very easy; but this inference is not easily digested by the party, and many Americans are irritated by being placed in so irksome a dilemma.

Because the physicians who most strenuously maintain this opinion have their vanity engaged in the support of it, and are only made more positive by contradiction; because they have prevailed upon the government to burthen commerce with heavy and vexatious restraints and impositions, and they would incur a great deal of odium, should they be brought to acknowledge the nullity and folly of these measures. I am, however, by no means an enemy to the establishment of lazarettoes and health-offices; I think them wise and useful, especially if the American trade extend itself much in the Mediterranean and the Levant.

Because the contagion and malignity which the doctrine of importation implies, affords an excuse to those whose patients seldom recover*.

When I concur with those who believe in the domestic generation of the yellow fever, I am far from

* Here Volney inserts a note too personal and frivolous to deserve introduction. The vanity and dogmatism displayed in the above enumeration of motives is highly censurable. Volney, and all violent controversialists, have not minds large enough to see the real complexity and obscurity of this question, or to admit the possibility of opposite opinions being adopted or defended with disinterested motives.—TRANS.

questioning the motives of those who think differently*, but I regard this doctrine as dangerous and hazardous, inasmuch as it has urged the government to encroachments upon personal security and liberty, and renders men indifferent to those domestic and internal measures and precautions, which are enjoined by the true nature of the malady.

As to the question of contagion, I cannot entirely concur with either party. There are too many facts to allow us to believe in its universally contagious nature; and if the source of the disease be found in moist and putrid exhalations, surely the effluvia from a diseased body must be efficacious in the same way. It appears accordingly, that at Philadelphia, in 1797, many families contracted the disease, on their return to town, in cold weather, by repossessing their houses, in which persons had died, without cleaning and purifying them. At Norfolk it was generally remarked, that those who left the city were, on their occasional returns to it, more liable to this disorder, than such as constantly remained in town: a case corresponding with that of strangers, especially from the north, who were always found, at New York and Philadelphia, to be particularly liable to infection.

Speculative reasoners endeavour to account for this by saying, that strangers were made more susceptible of fever by the greater quantity of oxygene infused into their blood by the pure air of the country, or of

* This is strange, after what has just before been said.—Trans.

Europe. But this oxygenation is merely conjectural; and from all the notions we have formed of this fluid, its presence and abundance must be more conducive to health than to sickness; and the opinion maintained by these theorists, that oxygene abounds most in low situations, is directly contrary to the discoveries of European chemists. The fluids which their experiments have disengaged from marshes and putrescent substances are carbone, hydrogen, and azote, and not oxygene.

The two first of these gasses, when confined, are productive of remittent and intermittent fevers, and when compounded with the third, or azote, tend to generate malignant or putrid fevers.

Future enquiries may unfold the nature of all these morbific fluids. At present, the best modes of destroying their effects seem to be: first, the use of diluents and refrigerants to abate inflammation, which is the first stage of the disease: perhaps a bath of 55 or 66 degrees, employed at the first approach of the disease, and continued for many hours, might be useful. Adepts in medicine must be left to judge of the benefits of very cold baths, by which some American physicians have given relief: but all depends upon the moment of their application, since its effects in one stage of the disease would be widely different at another stage. The great point is to prevent inflammation from advancing till it decompose the fluids, for in such a case the disease must run through all its stages. The first moments, therefore,

are precious, and in them blood may be taken, in small quantities, with benefit. A potent antidote is abstinence, with aqueous drinks, begun as soon as lassitude is perceived, with loss of appetite: this abstinence must be persisted in till hunger naturally returns, and both mind and body are restored to their usual activity*.

With respect to the general preservatives from this epidemic, they must be adopted by the general government, and must consist:

1. In regulating the commercial intercourse of the country, with a strict regard to foreign diseases. Ships from the Mediterranean must be carefully attended to.

2. In restraining the conduct of individuals, in the exercise of the right of property. This right, at present, is much abused, by filling up pits and low places with offensive and filthy matters. The Americans boast, with little reason, of their cleanliness, for the quays of New York and Philadelphia, and some of their suburbs, surpass, in public and private nastiness, any thing I ever saw in Turkey, where the atmosphere is salubriously dry†.

3. Measures should be taken for paving the streets, lanes, and alleys of cities. It has long been observed

* See an excellent treatise on the Effect of Abstinence, on the Approach of Acute Diseases, by E. Millar, M. D. New York Medical Repository, vol. I.

† If this declaration be true, the police of these cities ought to tremble.—TRANS.

in Europe, that all great epidemics have disappeared in London, Paris, Lyons, and other populous cities, since the public ways have been generally paved.

4. All stagnant water, and every putrescent matter, should be carefully prevented or removed. Among the rest, burying-grounds should be removed from the hearts of cities. Philadelphia has four vast cemeteries, in the finest and most populous quarters of the city, of the smell of which I was, in summer, quite sensible, but it has not one walk planted with trees.

5. The privies should be walled and paved. In their present state, their contents escape into the wells, by filtration through a sandy stratum. On the melting of the snow, and in summer droughts, the water rises to the same level in both, for both are equally *without walls*. This contamination of the well water is so evident, that, in Front street, water kept in decanters for three days, in the month of May, became thick, and acquired a noisome smell*.

Lastly, it is an important duty of the government to enlighten their people as to the consequences of

* Since Volney's visit great alterations have taken place. The introduction of the Italian poplar has turned some of the hottest and most open streets into shady avenues, and pure Schuylkill water is diffused throughout the whole city. The use of this wholesome element has made the noxious properties of the well water particularly conspicuous. The latter now produces nausea in those who formerly drank it without sensible inconvenience. The same improvements have taken place at New York and Wilmington.—TRANS.

that pernicious diet, which they have borrowed from their ancestors, the Germans and English. We may venture to affirm, that if a premium were offered for a regimen most destructive to the teeth, the stomach, and the health in general, none could be devised more efficacious for these ends than that in use among this people.

At breakfast they deluge the stomach with a pint of hot water, slightly impregnated with tea, or slightly tinctured, or rather coloured, with coffee; and they swallow, almost without mastication, hot bread, half baked, soaked in melted butter, with the grossest cheese, and salt or hung beef, pickled pork or fish, all which can with difficulty be dissolved.

At dinner they devour boiled pastes, called, absurdly, puddings, garnished with the most luscious sauces. Their turnips and other vegetables are floated in lard or butter. Their pastry is nothing but a greasy paste, imperfectly baked. To digest these various substances, they take tea, *immediately after dinner*, so strong that it is bitter to the taste, as well as utterly destructive of the nervous system. Supper presently follows, with salt meat and shell fish in its train. Thus passes the whole day, in heaping one indigestive mass upon another. To brace the exhausted stomach, wine, rum, gin, malt spirits, or beer, are used with dreadful prodigality.

These modes of diet are not unsuitable to the Tartarian tribes, from whom the people of the west of Europe were originally descended, yet they employ

none of these pernicious stimulants. Their wandering and *equestrian* life makes them capable of digesting any thing; but when nations change their climate, or sink into the wealth, refinement, and ease of a stationary people, the whole mass undergoes material alterations. The ploughmen of Germany or England may copy their hardy ancestors without much inconvenience; but not so those that dwell in cities, and pass their time in a slothful or sedentary manner, and still less those who change the chills and damps of their native climate for a torrid region like Georgia or the Carolinas. Habit itself, though almost omnipotent, cannot reconcile this system to so repugnant a climate. Hence it is, that the English are the least able to contend with the evils of tropical climates, of any people of Europe, and their American descendants must abjure the example, or they will incur the same inconveniences.

Regimen has so much influence on health, and is of such moment in the yellow fever, that this malady never appeared within the precincts of the Philadelphia prison, a circumstance no doubt owing to the rigid temperance observed in this institution, by which the stomach is never overloaded, nor the fluids depraved, and to the exclusion of spirituous liquors, for drunkenness is a vice as prevalent in the United States as among the savages themselves.

I am far from imagining that the manners of a nation, in these respects, can be easily or speedily changed. I know too well the infatuation of man-

kind, and the obstinacy of general and long-established habits; but I cannot help thinking, that if half the pains were taken by governments to enlighten their subjects as are taken to mislead them, a reformation might be wrought, such as the contemners of mankind have no conception of at present.

The ignorance and folly of mankind are cherished, instead of being combated, by their rulers; and hence the inveteracy of popular ignorance and folly; but if the present generation be unequal to the task of their own reformation, they might, at least, through tenderness for their offspring, adopt a plan of education by which posterity might be rescued from the evils of which their parents have so much reason to complain*.

The great and general cause of yellow fever, since the year 1790, I shall venture to affirm to be the sudden increase in the population of the maritime cities, in consequence of the French war, and the insurrections in the islands. The vast influx of floating pro-

* In this case, the rulers are just as much depraved as the subjects, and we can have little hopes of the child, when the parent glories in his sottishness, and thinks the happiness and dignity of manhood connected with the quantity he drinks. The whole purpose of government is vulgarly supposed to consist in repelling external enemies, and restraining the fraud or violence of individuals when immediately directed against the person or property of each other. The first end is effected by a revenue, to create or augment which the introduction and diffusion of inflammatory liquors are studiously promoted. The health or morals of the people, so far as these arise from the regulation of the passions and discipline of the manners, form no part of a politician's views.—TRANS.

perty, and of fugitives, into their cities, occasioned the hasty erection of numerous buildings, on ground not properly prepared for them. Trade has diffused riches before unknown among the people, and the labourer, whose wages have increased to a dollar and a half and two dollars a day, and the farmer, whose flour has brought him twelve or fourteen dollars a barrel, have indulged themselves in new luxuries, among which wine and brandy are the chief. Hence, at a time when the seeds of inflammation and putrescence had acquired new force, the bodies of men were particularly open to their influence, by means of the carelessness, uncleanliness, and excess, which every where prevailed*.

Such are the outlines of a picture of the soil and

* In finding out this cause, Volney's usual sagacity seems to have deserted him. As to the encrease of buildings, in Philadelphia; where the pestilence has been most malignant, it has always begun and raged in the most ancient quarters. The fugitives from the islands have brought with them not wealth but poverty, have had no sensible effect upon population, and have rather imported safety than danger from the yellow fever, from the influence of their example. Besides, the disease has raged in old and stationary towns, not visited, or very sparingly visited, by these fugitives. As to the influence of wealth, the disease has always made most havock among the most poor and the least thrifty. The prosperity of agriculture has had no such influence, because the farmer and miller are not harassed by the yellow fever. Public and private cleanliness has wonderfully increased since the first assaults of this disease, while the violence of these assaults has rather encreased than diminished. —Trans.

climate of the United States: a picture I have endeavoured to make as exact as its vast extent and variety would admit. I shall now leave the judgment of the reader to form his own notions of the comparative weight of evils and benefits belonging to a country, whose political as well as geographical situation fits it for acting so magnificent a part on the stage of the world. I am the less disposed to guide or influence the opinion of others in these points, because habit and prejudice are mighty, and particularly exercise their power over the judgments which we form of the comparative merits of countries. It has been no uncommon thing with me to hear opposite opinions advanced, in the same company, by travellers from different parts of Europe. The Dane and the Englishman exclaim against the heat of the climate, which the Spaniard and Italian think temperate enough. The Pole and Provencal complain of its moisture, while the Dutchman is rather inclined to think it too dry: each one, in these instances, being secretly governed by comparisons between what he sees with what he has been used to in his own country. Yet there is one thing in which they all agree, and that is in condemning the sudden, frequent, and violent changes in the temperature.

The Americans resent these censures of their climate almost as a personal offence. The motives of this partiality are obvious. In the first place, it naturally flows from that self-love or vanity, which is incident to nations as well as to individuals; and se-

condly, from regard to their pecuniary interest, which governs the state as well as the private citizens, and which prompts them to employ all means of selling land, and inviting foreign purchasers and foreign capitals*.

With such motives, it would be hard to persuade them that their country is not the best in the world. Yet if the adventurer endeavours to inform himself among the people themselves, the southern people will terrify him from fixing in the north, by dwelling on their long and dreary winters, the hardships of excessive cold, the expence and apparatus which a bleak air and churlish soil occasion in living or cultivating the earth.

The northern man, on the contrary, boasts much of his health, robustness, and activity, the gifts of labour, a sparing soil, and inclement skies; and rails against the pestilential bogs of the southern states, their sultry and incessant heats, their tormenting insects, the slothful and luxurious habits, and the crazy constitutions of the people, their gambling, drunkenness, and tyranny over their slaves: all produced by the very nature of their soil, and its luxuriant ferti-

* This is absurd in both respects, for there is a large party in the state who abhor and discourage *im*migration, and not one private man in a thousand has any personal interest in the coming of strangers. Volney has given an air of mystery and singularity to a trite and universal fact, and makes no allowance *in this place* for the force of habit, which lessens the evils of a climate to the native, and aggravates them to the stranger.—Trans.

lity. The Carolinian will join with the Vermont man, however, in decrying the middle states, as possessing all the evils, without any of the benefits of either of the extremes. At Philadelphia, I have heard a Carolinian complain of heat, and a Canadian of cold, merely because both were improvident, and took not the suitable precautions against the weather. So, likewise, if the stranger sets on foot enquiries in a notoriously sickly district, every one will describe his own farm as free from the evil, and kindly traces it either to his neighbour's domain, or to some foreign country. The truth is, that every nation and every individual complains of his own country or district, and yet, at the same time, prefers it to all others, through the influence of vanity, interest, and, above all, of all-powerful habit. The Copt prefers his mud, the Arab his sands, the Tartar his wilderness of long grass, the Huron his canopy of boundless woods, the Hindoo his sunny plains, the Esquimaux and Samoiede his bleak and naked shores: neither would change his country for another. Such is the magical influence of habit, the force of whose spell we can only know by stepping out of our own circle, and bringing ourselves into collision with others. Habit forms a sort of atmosphere around us, to whose peculiarities our senses are dead, till we go forth and breathe a different air.

Those who have never stept out of their own circle, and yet speculate on the habits of others, are like blind men discoursing about colours, and I think the

best criterion of a rational mind, is to pronounce his judgment upon such points with diffidence and hesitation. I do not pretend to divest myself of my native habits, or forget my peculiar constitution, when I venture to say, that the climate of Egypt, Syria, France, and all the borders of the Mediterranean, is far preferable, both as to salubrity and pleasantness, to that of the American states; that were I obliged to select the most favourable spot in America as the place of my abode, my choice would fall upon the southern point of Rhode Island, or the south-west chain in Virginia, between the Roanoke and Rappahannock. In the western country, I should prefer to live, a hundred years hence, on the margin of Lake Erie, for then it will not as now be infested with fevers. At present, if my choice were guided by the reports of travellers, it would fix upon those highlands of Florida and Georgia, which are to windward of the nearest marsh*.

* A district with a dry, gently undulating, and well cultivated surface, in the middle and eastern states, has certainly the strongest physical claim to salubrity. As the greater part of New England, the inland of New Jersey, and the eastern part of Pennsylvania answer to this description, they are entitled equally, and in a high degree, to this praise, and as long life, with as few diseases, are to be found in such districts as any where in France, Spain, or Italy. A northern climate, and a social and agricultural state, similar to that of Norway and Scotland, is doubtless still more favourable to health and longevity.—Trans.

SUPPLEMENT.

No. I.

On the Winds of Norway and Sweden.

THE great inundations that took place in Sweden, in the summer of 1800, were without any rain sufficient to account for them. I have hence been led to suspect that they were occasioned by an unusual accumulation of clouds on the bordering mountains, by means of long continued winds; and, in order to ascertain the truth, I addressed myself to Mr. Bourgoing, the French ambassador at Copenhagen, who is an eminent and zealous friend to useful knowledge, and requested him to procure for me answers to certain questions which I sent him. He communicated my queries to several learned men, and among the rest to Messrs. Melanderhielm, Swanberg, Loevener, Schoenheuter, Webbe, Grove, and Buch. Their comments on these questions were politely communicated to the minister, and by him to me, and have

furnished me with a body of valuable facts, which I afterwards put upon paper, and transmitted to the ambassador, as a token of my gratitude for his friendly assistance.

As these facts have some connection with the speculations contained in this work, I have thought proper to insert them here. In doing so, one of my views has been to draw the attention of meteorologists to the laws which govern the winds of the polar circle, and to point out the analogy or correspondence between the north-west and north-east winds of America with those of Russia and Sweden.

From the various notes transmitted to me, and particularly from the brief, but exact and methodical, statements of Mr. Schoenheuter, bishop of Drontheim, in Norway, the following facts are clearly made out:

1. That Norway is intersected, from east to west, by a mountainous chain called the Dofrefeldt or Dofrine hills, which divides the country into two parts, northern and southern.

2. That the height of this chain, one of the highest in Norway, is about 3000 feet.

3. That the influence of this chain upon the motions of the atmosphere is such, that these two parts have scarcely ever the same wind and weather at the same time. If there be rain at Aggerhus or Christiansand, on one side, it is dry weather at Drontheim or Nordland, on the other. The same representation is made by Mr. Buch.

4. This distinction was particularly striking in the summer of 1800, when incessant rains deluged the province of Drontheim, north of the hills, so that the harvest was entirely ruined, while an excessive drought prevailed in the southern districts of Aggerhus and Berghen. In Drontheim, from the month of June to the 20th of August, the wind did not deviate one point from the north-west, for twenty days; and the thermometer, fluctuating between 46 and 50 degrees, never rose above 57. At Aggerhus and Berghen the wind was steadily south, south-east, or south-west, the mercury ranging between 63 and 72. All the rainy days scarcely amounted to seven. The observations made at Dronthiem and Christiansand, compared together, afford twenty instances of rain at Drontheim, with the wind at north-west, while at Aggerhus it was fair and dry, with a south-east wind; so that directly opposite winds blew, at these different places, at the same time. According to Mr. Schoenheuter, Jemteland, in Sweden, which is east of Drontheim, experienced the same rains. As to the prevailing wind he was not informed.

He joins with Messrs. Webbe, Grove, and Buch in stating the prevailing wind on the coast of Norway to be west; that this wind is rainy, owing to the neighbouring ocean, while the north-east, south-east, and east are dry. The north-west and south-west prevail north of the hills, while the west and east are rare. On the coast of Berghen and the valley of the Louken, the south-west and west, with rain, prevail.

In the valley of the Glomen and Gulph of Aggerhus, the reigning winds are the south-west, which is chiefly rainy, and the south-east, which is occasionally both wet and dry.

At Stockholm, Mr. Swanberg and Mr. Melanderhielm inform me, that the west and south-west prevail, and are dry; that the wet winds are the east, north-east, and, in summer, the south-east; but that Smaland and Scania have weather similar to that of Aggerhus. In 1800, June and July were very wet at Stockholm; but they add no table of the winds, which probably were easterly. At that time the north-west blew at Drontheim, the south or south-east at Aggerhus, and the east in the Gulph of Bothnia. Hence it appears that the Dofrine mountain was the point of meeting or encounter between three opposite winds.

I shall not enter into a minute account of the atmosphere at Stockholm, but shall content myself with observing,

1. That the Swedish inundation could not proceed from melting snows, for these are all dissolved before June and July.

2. That the Dofrine hills, though not so compact as a wall of masonry, have undoubted influence on the currents of the air. Though mountains may exist in clusters, and want a direct junction, they may yet impede or thwart the airy streams, especially if their intervening vallies have different directions, as ledges of rocks, though detached and unseen in the beds of rivers, check and disturb the current.

No. II.

On Florida, and a work entitled a Concise Natural and Moral History of East and West Florida, by Bernard Romans. 12mo. *New York*, 1776.

BERNARD ROMANS was an enlightened physician and observer, who spent several years in Florida. He divides the country into two climates; one of which he calls the northern, extending from latitude 31° to 27° 40′; the southern extending to the end of the peninsula, in latitude 24°. This distinction he chiefly founds upon the frequency of frosts within one line, and their rarity beyond it. He might have said, more accurately and distinctly, that water freezes as far south as 27° 40′, but ceases to freeze in the rest of the peninsula.

The air of the country is clear and pure. Fogs are unknown, except upon St. John's river, but the dews are heavy. Spring and autumn are dry seasons, but the temperature of the latter is very variable. Winter sets in with wet and tempestuous weather: February and March are dry and clear: from September to June, inclusive, there cannot be a finer climate; but July, August, and September are intensely hot, though the temperature is less variable than that of Carolina, and frost is much more rare.

The noon-day sun is scorching at all seasons, and the cold never injures the orange, which flourishes here in the greatest perfection. St. Augustine is on the frontier of the two climates*.

The eastern trade wind prevails on the Atlantic side of the peninsula. On the coast of the gulph, the west and north-west sea breezes diffuse an agreeable coolness every where in summer. All kinds of fruit flourish here, without being incommoded by extremes of heat or cold. The rain is foretokened one or two days beforehand, by excessive dews, or by the total want of them. The winds fluctuate less than in the country further north. During the greater part of spring, throughout summer, and in the first months of autumn, the wind is chiefly north-east; at the close of winter and the opening of spring, it is west and north-west.

For twenty days before the autumnal equinox, and seventy or eighty after it, storms and hurricanes are to be expected in this quarter; but our historian relates, that he never heard of any violent commotion at the vernal equinox. The dreadful hurricanes of 1769 began on the 29th October, that of 1772 on the 30th of August. It first blew east and south-east at Mobile; further west its course was north-north-east. It did little damage at Pensacola. This tempest

* A geographical error of Volney's, this town being in latitude 29° 45′. Romans expressly placed this line about two degrees southward of this town.—Trans.

swelled all the rivers to a great height and extent; but the most remarkable circumstance attending it was the mulberry-trees putting out a second crop of blossoms and fruit.

The south and south-west winds occasion very thick and unwholesome fogs. They also breathe that suffocating air, so much complained of in July and August. The south-east and north-east winds, on the contrary, are cool; they moisten the earth, and fertilize the very sand with frequent showers. The winds between east and north are sprightly and cool. Between north and north-west they are almost cold. The mercury ranges between 84 and 88 degrees in the shade, where there is ample ventilation. In July and August, in the shade, it reaches 94. In the sunshine it mounts to 114. It never sinks below 30. The weather, from October to June, inclusive, is inexpressibly delightful. The eastern side of the peninsula is more sultry than the west, or than the northern district, the shore of which is obnoxious to the keen blasts of winter.

The extremity of Florida, on the western side, is very liable to storms and whirlwinds, from May to August. They rise suddenly from the south-west and south-south-west, and are transient.

Dr. Mackenzie has said much of the effect of the air in producing mould, rust, &c. but though this is manifest at St. Augustine, yet there is not a healthier place than this in this quarter. The inhabitants enjoy sound health, and reach great longevity, and in-

valids resort hither from Cuba, as to another Montpellier.

The northern district, which is formed by the continental part of Florida, resembles the southern part of the peninsula, but its customary winds are somewhat colder. The epidemic of Mobile, in 1760, arose entirely from the intemperance of the soldiers. Even physicians advise the settlers to a moderate use of liquor, but, unluckily, they are sure to overleap the prescribed bounds, and to run into excess.

The great evil of the American climate is not the degree of temperature, either high or low, nor the drought, nor the wet, but it is the violent and sudden transition from one state to its opposite. So great are these changes, that they sometimes amount to 30 degrees in twelve hours, and this evil is much greater in the north than the south.

The soil of Florida is generally a bed of white clay, with a stratum above it of white sand. The coast is naked and bare, but the inland is a forest of firs.

Bernard Romans agrees with me in his notions of the savages. He describes them as a sottish, filthy, idle, pilfering and haughty race; vain, irritable, vindictive, and ferocious. The Chickasaws he singles out as the worst of them all, and the Chactaws are, it seems, a little better. They are honest, have some notions of personal property, and are more industrious than the rest. They are hospitable to excess; but are improvident, selling their all to the pedlar, and

hazarding their all in gambling. Suicide and sodomy are crimes by no means rare among every tribe.

In 1771, the Chickasaws could muster 250 warriors, the Chactaws 2600, and the confederate Creeks 3500; which together make up no despicable force of upwards of 6000 men*.

On the soil and produce of the country, our author is very full and satisfactory. He divides the land into six different kinds: the pine land, hammock land, savannahs, swamps, marshes, and bay, or cypress, galls.

"First, the pine land, commonly called pine barren, which makes up the largest body by far, the peninsula being scarce any thing else; but about a hundred miles towards the north-west from St. Augustine, and about two hundred from the sea in West Florida, carry us entirely out of it. This land consists of a grey or white sand, and in many places of a red or yellow gravel. It produces a great variety of shrubs or plants. The principal produce from whence it derives its name is the *pinus foliis longissimis ex una theca ternis*, or yellow pine and pitch pine-tree, which I take to be a variety of the same species, both excellent and good timber.

* In the following pages, the translator has extended a little the quotations of Volney, as B. Romans' information on the soil and diseases of those provinces is very curious and authentic, and, at the same time, his book is out of print, and extremely rare.—Trans.

" Also the *chamœrops frondibus palmatis plicatis stipitibus serratis*, of whose fruit all animals are very fond.

" It is on this kind of land that immense stocks of cattle are maintained, although the most natural grass on this soil is of a very harsh nature, and the cattle not at all fond of it. It is known by the name of wire grass, and they only eat it while young. For the procuring it young, or renewing this kind of pasture, the woods are frequently fired, and at different seasons, in order to have a succession of young grass, but the savannahs that are interspersed in this kind of land furnish a more plentiful and more proper food for the cattle.

" Some high pine hills are so covered with two or three varieties of the oak, as to make an underwood to the lofty pines; and a species of dwarf chesnut is often found here; another species, of a larger growth, is also found in the lower parts, particularly in the edges of the bay or cypress galls.

" This barren and unfavourable soil, in a wet season, bears many things far beyond expectation, and is very useful for the cultivation of peach and mulberry orchards. This land might also be rendered useful for many other purposes; but either the people do not chuse to go out of the old beaten track, or content themselves with looking elsewhere for new land, improveable with less cost. The method of meliorating it is certainly obvious to the meanest capacity, as it every where, at a greater or less depth, covers

a stiff marly kind of clay, which I am certain, was it properly mixed with the land, would render it fertile; and this might be done with little expence, the clay lying, in some places, within half a foot or a foot of the surface: in most places it is found at the depth of three, four, or five feet, consequently not very hard to come at. In East Florida, in the southern parts, this kind of land is very rocky, but especially from the latitude 25° 50′, southward to the point, where it is a solid rock, of a kind of lime stone covered with innumerable small, loose, and sharp stones, every where.

" In West Florida the pine land is also frequently found rocky, with an iron stone, especially near where the pines are found growing in a gravelly tract, which is frequently the case here.

" The hammock land, so called from its appearing in tufts among the lofty pines: some small spots of this kind, if seen at a distance, have a very romantic appearance. The large parcels of it often divide swamps, creeks, or rivers from the pine land; this is indeed its most common situation. The whole of the uplands, remote from the sea in the northern parts, is this kind of land: its soil is various, in some places a sand of divers colours, and in East Florida often a white sand; but the true hammock soil is a mixture of clay and a blackish sand, and in some spots a kind of ochre. In East Florida some of this is also sometimes found rocky; on every kind of this land lies a stratum of black mould, made by the decayed leaves,

&c. of the wood and other plants growing upon it. The salts contained in this stratum render it very fruitful, and, when cleared, this is the best, nay, the only fit land, for the production of indigo, potatoes, and pulse: the first crops, by means of the manure above-mentioned, generally are very plentiful; but the salts being soon evaporated, if the soil over which it lay should prove to be sand, it is not better than pine land; the other sort bears many years planting: its natural produce is so various in this climate, that the complete description of all would be more work than one man's life-time would be sufficient for.

"The savannahs are in this country of two very different kinds: the one is to be found in the pine lands, and, notwithstanding the black appearance of the soil, they are as much a white sand as the higher lands round them. True it is that clay is very often much nearer to their surface than in the higher pine lands; they are a kind of sinks or drains to those higher lands, and their low situation only prevents the growth of pines in them. In wet weather, the roads leading through them are almost impassable. On account of their producing some species of grass, of a better kind than the wire grass, they are very often styled meadows; and I believe, if they could be improved by draining them, without taking away all their moisture, very useful grass might be raised in them; but on draining them completely, they prove to be as arrant a sand as any in this country. These savannahs often have spots in them more low

than common, and filled with water: they are overgrown with different species of the *cratægus*, or hawthorn, as also very often a species of shrub much resembling the *laurus* in appearance, but as I never had an opportunity of seeing it in blossom, I cannot describe it, so as to ascertain the genus it belongs to. In its fruit it is widely different from any of the laurel kind, that have fallen under my inspection; it is a bacca, with several cells, full of an agreeable acid, like the common lime from the West Indies; it is of the size of a large pigeon's egg, but more oblong. We also find it on the low banks of rivers in Georgia, and know it by the name of the Ogeechee lime.

"The other savannahs differ very widely from these, and are chiefly to be found in West Florida. They consist of a high ground, often with small gentle risings in them. Some are of a vast extent, and on the west of Mississippi, they are said to be many days journey over. The largest within my knowledge is on the road from the Chactaw to the Chickasaw nation, and is in length near forty miles over, from north to south, and from one end to the other a horizon, similar to that at sea, appears. There is generally a rivulet at one or other, or at each, end of the savannahs, and some come to the river banks: in one or two of them I have seen some very small remains of ancient huts, by which I judge they were formerly inhabited by Indians. The soil here is very fertile; in some I have seen fossil shells in great numbers, in others flint, in others again some chalk

and marl. It is remarkable, that cattle are very fond of the grasses growing here; the Chickasaw old field, as it is termed, is a clear demonstration of this, for the cattle will come to it from any distance, even when the grass scarcely appears; and in all the circumjacent tract are abundance of both winter and summer canes to be found, on which they might more luxuriously feed. In these savannahs, if a well or pond is dug, the water has a very strong nitrous taste. I have seen some very curious plants in this kind of ground, but there was no time for my examining any of them, except a nondescript of the genus *tagetes*, of a fine crimson colour. I shall, in some measure, describe and give the figure of this plant. The only high growth I have seen in these savannahs are some willows and other aquatic plants, by the side of rivulets, in or near them: some of the smaller kind of oaks, and a few small *junipers*, are also to be seen in those places; the *fragaria*, or strawberry, is very common in them.

" Swamps are also found of two kinds, river and inland swamps. Those on the rivers are justly esteemed the most valuable, and the more so if they are in the tide way, because then the river water may be at pleasure let on or kept out, with much less labour and expence than in the other kinds. These lands are the sources of riches in these provinces, because, where they lie between the sandy pine barrens, they produce that valuable staple rice, and on the Mississippi, where much of this river land is situated a

great deal higher than the common run of it in Carolina and other similar countries, this soil is the best adapted for corn and indigo yet known. Some of these grounds are clay, others sand, and others again partake of both; when used for rice it matters not which of these soils they are made up of; but, I believe, were the sandy ones to be quite drained, they would prove barren enough. The *use of water on rice is more to suppress the growth of noxious weeds and grass*, which would otherwise stifle the grain, than for promoting the growth of the rice itself; for none of the grasses can stand the water, but rice does, as long as it is not totally immersed. Therefore it is, that after weeding, the planter, if he has it convenient, lets on water to about half the height of his grain. By swamps then, in general, is to be understood any low ground subject to inundations, distinguished from marshes in having a large growth of timber, and much underwood, canes, reeds, wythes, vines, briars, and such like, so matted together, that they are, in a great measure, impenetrable to man or beast. The produce of these swamps, if sandy, is more generally the cypress tree, which is here of three species: two of these grow in this kind of land; the common sort grows to an enormous size, but none so large as what are seen on or near the banks of the Mississippi; the other kind, vulgarly miscalled white cedar, is in great quantities near Pensacola, particularly in the swamps of Chester river: this likewise grows to a tree, which may be ranked among those of the first magnitude.

" The back or inland swamps answer in situation to what are called the meadows or savannahs, among the pine lands : their soil being rich, occasions them to bear trees. The true back swamps, that are in wet seasons full of standing water, bear scarcely any other tree, than a variety of that species of nyssa, distinguished by botanists by the name of *nyssa foliis latis acuminatis non dectatis fructu æleagni minore, pedunculis multiflore*, vulgarly called bottle arsed tupelo. The continuance of water on this kind of ground is the reason why scarce any undergrowth is found here. There are swamps also called back swamps, but they are either at the head of some stream, or have more or less water running through them ; these are generally easy to drain. I would have confined my description of back swamps to the first or standing ones, and ranked the last, which I think might properly be done, among the river swamps, but I was apprehensive that it might have displeased some person, who entertains the more established opinion. These last described often are found mere cypress swamps ; in that case they are almost impassable, by reason of the cypress spurs, even when dry, and for horses they are extremely dangerous, as they often get staked on those spurs. This vegetable monster I do not remember to have seen mentioned any where. When this kind of swamp is not overgrown with cypress alone, its product is the same as that of the river swamps above-mentioned, and in that case the

soil is certainly good; these last, when properly drained, are the best land for the cultivation of hemp.

" The marshes are next to be considered. They are of four kinds, two in the salt, and two in the fresh water. They are either soft or hard ; the soft marshes, consisting of a very wet clay or mud, are as yet of no use, without a very great expence to drain them ; the hard ones are made up of a kind of marly clay, which in dry seasons is almost burned up. True it is, they afford a pasture sufficient to keep any graminiverous animals in good order; but their milk and flesh, in seasons when the cattle near the sea side cannot find any other food, and conseqeuntly feed on this alone, have so horrible a taste, that no stranger to the country can make use of them. Hard marshes, in general, are such whose soil has too much solidity for water to disunite its particles, by penetrating them; the soft marshes are those whose spungy nature allows the water easily to penetrate them. I have seen of both kinds on Turtle river, about twenty miles up, in which, at about eight or ten feet below the surface, there are numbers of cypress and other stumps remaining, but chiefly cypress, and many of the fallen trees crossing each other: this is only to be seen at low water, and to the height above-named. These trees are covered with a rich, nitrous, muddy soil; but I beg leave to expect, that better naturalists may explain this extraordinary appearance: I be-

lieve them ruins of ancient forests, on which the sea has encroached*.

" The marshes on fresh water are in every respect similar to those on the salt, except that they are not impregnated with the saline particles, of which the first are very replete; therefore the hard ones, with little trouble, are adapted to cultivation; the soft ones cost a considerable deal more of expence, to render them fit to answer this purpose, but when so drained as to answer this end, they certainly are by no means inferior to any land in this country. In the lower part of these marshes grows a *kind of hitherto undescribed grain*, of which the western Indians make a great use for bread. I never could see it in blossom, therefore cannot describe it. It is known by the name of *wild oats*.

" This kind of land produces rice very willingly, but, if sufficiently made dry, always proves the best for corn, indigo, and hemp. I have seen at Mr. Brewington's plantation, about three miles below Savannah, in Georgia, very good corn and rice together, with the two kinds of melons, and cucumbers in great perfection, on this species of soil.

" I shall next describe the bay and cypress galls. These intersect the pine lands, and are seldom of any breadth; the bay galls are properly water courses,

" * The whole appearance of this river seems to indicate such an ancient and unrecorded hurricane, on this part of the coast.

covered with a spungy earth mixed with a kind of matted vegetable fibres. They are so very unstable as to shake for a great extent round a person, who, standing on some part thereof, moves himself slightly up and down; they often prove fatal to cattle; and sometimes I have been detained for above an hour at the narrowest passes of them, they being so dangerous to cross, that frequently a horse plunges in, so as to leave only his head in sight. Their natural produce is a stately tree, called loblolly bay*, and many different vines, briars, thorny withs, and on their edges a species of red or summer cane, which together combine to make this ground impenetrable, as if nature had thus intended to prevent the destruction of cattle in these dismal bogs, which would be particularly fatal to many of them in spring, when the early produce of grass and green leaves in these galls might entice them into this danger, was not such a natural obstacle in their way. As these have generally vent, they are sometimes drained, and rice planted therein, which, for one or two years, thrives there tolerably; but this ground is so replete with vitriolic principles, that the water standing in them is impregnated with acid, insomuch that I have tasted it sour enough to have persuaded a person, unacquainted with this circumstance, that it was an equal portion of vinegar and water mixed together, therefore it requires to lie open at least one year before it

" * *Hyperium, seu Gordonia Lasianthus.*

will bear any thing, and they generally, by lying open four or five years without any other draining, become quite dry, and might be advantageously used for pasture ground.

" The cypress galls differ from these, in being a firm sandy soil, in having no vitriolic taste in the water, and very seldom vent. I never knew these made use of for the purpose of planting, and the cypress they produce is a dwarf kind, not fit for use, being very much twisted and often hollow. There is no undergrowth here, but in dry seasons some tolerable grass. Through all the above species of land we find a distribution of very fine clay, fit for manufacturing. The finest I ever saw is at the village on Mobile Bay, where I have seen the inhabitants, in imitation of the savages, have several rough made vessels thereof.— There is also a great variety of nitrous and bituminous earths, fossils, marls, boles, magnetic and other iron ore, lead, coal, chalk, slate, freestone, chrystals, and white topazes : these last in the beds of rivers. Ambergris is sometimes found ; one Stirrup a few years ago found a piece of a very enormous size on one of the keys. There is also much of a natural pitch, or *asphalthus*, vulgarly called *mungiac*, thrown up by the sea. The uplands also afford a metallic substance, appearing like musket bullets, which, on being thrown into the fire, go off in smoke with a very sulphureous stench.

" The water in this country is very various as to taste, quality, and use. There are salt, brackish, ni-

trous, sulphureous, and good fresh springs in most parts of this country, as well as salt and fresh lakes, lagoons, and rivers. The rivers also vary in many respects, and so does the sea, as well in the colour and clearness of the water, as in its degree of saltness. The water of St. Mary's and Nassau, and all the brooks that run into them, is very good, wholesome, and well tasted. The colour in the rivers is dark, as in all the American rivers of the southern district. St. John's is a curiosity among rivers indeed; this rises at a small distance from the lagoon called Indian river, somewhere in or near the latitude of 27, perhaps out of the lake Mayacco, which I have reason to believe really exists, and is the head of the river St. Lucia, as I am told by a credible Spanish hunter, who had been carried there by way of this last river. From its origin it runs through wide extended plains and marshes, till near the latitude 28°, where it approaches the lagoon much. It then continues its course with a considerable current northward, and glides through five great lakes, of which the last, called Lake George, is by much the most considerable. In this last lake is about eight feet water; it is twenty miles long, and about eleven or twelve wide. All these lakes and the river in general is very pleasant. Endless orange groves are found here, and indeed on every part of the river; below these the river grows wider, loses its current, and has in some places none, in others a retrogade one, when yet lower down it is again in its true di-

rection. The banks of this river are very poor land, and exhibit, in a number of places, sad monuments of the folly and extravagant ideas of the first European adventurers and schemers, and the villany of their managers. The tide does not affect this river very far up. In many places, high up this river, are found some extraordinary springs, which, at a small distance from the river, on both sides, rush or boil out of the earth, at once becoming navigable for boats, and from twenty-five to forty yards wide: their course is seldom half a mile before they meet the river. Their water is, contrary to that of the river, clear, so as to admit of seeing a small piece of money at the depth of ten feet or more; they smell strong of sulphur, and whatever is thrown in them becomes soon encrusted with a white fungous matter; their taste is bituminous, very disagreeable, and they, in my opinion, cause the green cloudings we see on the surface of the water of this river, and make it putrid, and so unwholesome as experience has taught us it is.

"I have no sufficient ground to decide upon another circumstance, which I am told, viz. that when rice is overflown with this river water, it kills it: above these springs the water of the river is good. This river is from one and a half to three miles wide, except at the house of Mr. Rolle, who has here made an odd attempt towards settling and making an estate in as complete a sandy desart as can be found. Just above this, it is full of islands, exhibiting every where a very romantic appearance. There is a fine piece of

water, called Dun's Lake; this is about nine miles from the river, eastward from this place; this empties itself by a stream into the river. Another, called the Doctor's Lake, is on the west side, about sixty miles from the mouth: we see a variety of aquatic plants floating thereon.

"In my journey by land from the Bay of Tampe across the peninsula to St. Augustine, I crossed twenty-three miles from east to west of miserable barren sand hills: the grain of the sand is very small and ferrugineous. These hills rise a considerable height; on them is some growth of very small pines, and a very humble kind of oak grows so thick, that with the addition of some wythes and other plants, to me utterly unknown, they render it absolutely impenetrable. In this ridge, which, as far as I can learn, extends from north to south, between the rivers St. John and *Ocklaw-wawhaw*, for about a hundred and fifty miles, having no where any water in its whole extent; and, I am told, that where we crossed it is its narrowest place; my Indian guide had the precaution to carry water for ourselves and horses, which proved very serviceable, as it was a very hot day, no growth of trees to shade us, and such a burning sand for the sun to reflect on. I leave the reader to judge what we suffered, though it was but a short distance over; both ourselves and beasts often experienced the necessity of carrying water. What must travelling over this place be in a hot day, where it is forty or more miles wide?

" Before I leave St. John's river, I must not forget the river running from south to north, called Pablo. This originates at a small distance from St. Mark's or North River, and empties into St. John's, at a small distance from the mouth. The water of this river is good, so is the land on it; and it is thought that a communication with St. Mark's or the North River might be effected without much difficulty; this would open an inland navigation by canoes or boats, all the way from Carolina to near the Mosketo.

" The river St. Mary, although it is said to originate in the *Ekanphanækin* swamp, has a current of fine, clear, and wholesome water, supplied from the pine lands through which it flows, with many fine springs, runs, and rivulets of very clear water. Nassau has also the same blessings, but doth not spring far distant from the sea. On Amelia Island, near the sea, is a very good spring, which makes a fine stream for some miles, dividing the island almost into two; but below the spring its water is not commendable. On the beach between St. John's and St. Augustine, at or near a place called the Horseguards, there are three good springs running into the sea, and in *every part where the beach is clear sand*, water is obtained *by digging*. About four miles north of St. Augustine, rises St. Sebastian's creek, being a good fresh spring; it soon joins a creek in salt marshes, and at a small distance from town it becomes very large and deep. It empties into St. Anastasia's

Sound, two miles south of St. Augustine, making a peninsula of this territory nearly in form of a crescent. Three miles farther south is the mouth of the river St. Nicholas, not very considerable; St. Cecilia in the same sound; the North-west, south of the Matanca and Penon; the Tomoke and Spruce creek, in the Musketo Lagoon, and in short every river and creek in the country, except those above-named, are excellent wholesome water. Thus much, I suppose, will suffice as to the nature and quality of the water. All the rivers and springs in West Florida are good."

The author has given us the characteristic portraits of a Chactaw, Chickasaw, and Creek man, and, though coarsely executed, the physiognomy is well preserved. The whole book, indeed, is a valuable and interesting account of the manners of the Florida savages, and the face and products of their country. He treats with judgment on the diseases of the country, and points out the errors and exaggerations of Dr. Lind. He does not deny the excessive damps of the climate of St. John's and St. Augustine, but he maintains that St. Augustine is very healthy, because it has not the marshes of St. John's.

Sudden and violent changes of temperature, with heavy dews, are frequent at St. John's, Nassau, Mobile, and Campbeltown; but at Pensacola and the country east of it, at New Orleans and on the Mississippi, they were not complained of. These inconveniences, however, are much greater in Georgia, and greater still in Carolina. People guard against

them by kindling an evening fire, and by putting on flannel. There are no brackish swamps, except at St. John's, whereas they are common in Georgia and the Carolinas, and the air is loaded with their mosquitoes and noisome exhalations.

Flies and mosquitoes abound only in the plantations of rice and indigo. As cultivation advances they retire. The shores of the Mississippi are infested with these venomous insects, to a degree scarcely credible, nor is there any living, but under the protection of mosquitoe nets*.

Our author is correct in dissuading all adventurers from coming hither, who are luxurious and intemperate, who are of a full habit or plethoric constitution, unless they can resolve to submit to a thorough change of regimen. Fevers prevail in July, August, and September, and half of October, that is, immediately ensuing the heavy sultry rains. They are more obstinate in the low wet lands, where rice and indigo are cultivated.

" Fevers are the first of the summer diseases. The ancients have ages ago made an observation, that the season of the reign of this terrible disorder was always preceded by an atmosphere laden with great heats and much rain, for some time; the modern writers seem to me to be generally of the same opi-

* At night, and in the houses or woods, for half the year, this plague prevails, and the very negroes are obliged to screen themselves behind a curtain or net.—TRANS.

nion. This is exactly the case in all the southern provinces, for fevers begin to take place, in some districts more, in some less, about the latter end of July and in August, and continue throughout September and part of October: just the season immediately succeeding our greatest rains and most violent heats. Here I will notice a remark* which I have read long ago, and I find it confirmed in all climates, "That the middle of the third month was observed to be the period of the greatest rage of epidemical disorders." Those districts which lie near to low rice fields, particularly in back swamps, and to such indigo works, where the planter is obliged to make reservoirs of water, are most liable to these disorders, after and during the latter part of an excessive drought; because in those neighbourhoods the air is at such times most prodigiously laden with corrupt moist effluvia. For this same reason, cool rainy summers will make those places more healthy than dryer spots, because, during such a season, all the above-mentioned noxious exhalations do not take place in so great a degree, and the air is kept cool by the frequency of the showers. However, such situations will never be so common in the Floridas as in Carolina or Georgia, the quantity of good, wholesome, fresh, running water being infinitely greater, and con-

"* Enquiry concerning the Cause of the Pestilence, and the Diseases in Fleets and Armies, London, 1759.

sequently little necessity of making stagnating ponds or dams.

" It must be allowed, that all fevers, however dissimilar in appearance, proceed from the same origin: Nature only works with more or less violence to rid herself of what is detrimental to her.

" The *ephemera*, or day fever, occasioned by a mere increase of the velocity of the blood, by means of a fit of drunkenness or debauch, or originating from violent exercise during the heat of the day, is too frequently seen here; but as it is seldom of a longer continuance than eighteen or twenty hours, it has not often dangerous consequences, and may be avoided by every person. I shall content myself with barely observing, that some cooling acidulated liquid aliments will soon abate its violence; bleeding may likewise be of use to restrain its force.

" The continual fever, or inflammatory fever, is sometimes though rarely experienced in this climate, but seldom attended by those dreadful symptoms and fatality, which accompany the same kind of fever, though of a more violent class, in the countries immediately between the tropics. This, in its common form, lasts about ten or twelve days, beginning to abate its violence, in general, after the seventh: the fourth or fifth is often fatal.

" I am persuaded, that whenever the yellow fever has made its appearance in the Floridas, it was imported from Jamaica or Havannah, as was the case in

1765, which, by the way, was almost universally an unhealthy *æra*, as well in Europe as elsewhere.

" This continual fever begins with an excessive heat of the whole body, continued though not violent head-ache, great drought of the tongue and palate, and consequently a continual desire to drink. Those people who die of this disorder generally depart on the fourth day, and I am of opinion that few are carried off by it, except such as are kept too close confined from the fresh air. I would recommend the keeping the sun out of the room, but to admit as much air as will gently ventilate it; a cooling diet, such as rice gruel, barley water, infusions of balm or sage, and lemonade, which is lime juice, water, and very little sugar; lime juice, syrup of lemons, and currant jelly should moderately enter into every part of the patient's diet; avoid all salt, spices, spirituous liquors, or generous wines: a gentle purge of glauber salt, with a few grains of *kermes mineral*, and some drops of oil of mint, is generally given on the first appearance of the disease; the effects of this are forwarded by frequent draughts of warm chicken broth. During the operation of this avoid all acids: bleeding, especially if the disease makes a violent attack, and the patient is of a plethoric habit, is indispensably necessary; the patient ought, by all means, to avoid motion, and, notwithstanding the above caution of admitting air in the room, keep himself covered, and be careful not to throw his bed-clothes aside. If the symptoms abate after the above mix-

ture, emetics are commonly prescribed: if it still continues, particularly if attended with delirium, lethargic symptoms, or their reverse, blisters are applied, and in great watchfulness some laudanum is used: if worms are suspected, an infusion of Indian pink root*, a very common plant here, leaves, wood, and all, is made use of as tea; but this plant possessing a pretty strong narcotic quality, ought to be used with caution. In excessive heats, some grains of sal nitri are added to the liquors administered to the patient; and as soon as the fever begins to abate, some orange, lime, or lemon juice, saturated with salt of wormwood, is given by a small tea-cup full every two hours.

"Intermittents are endemial in all low situations. Thus we see, in all the provinces to the southward, particular places remarkable for a continuance of this disorder in them; such as, more especially, Jacksonburg, in South Carolina, Savannah, in Georgia, Rolles-town, and most of the settlements on St. John's, in East Florida, at Campbeltown, near the mouth of the Escambe, and at Mobile, in West Florida. This disease attacks people much in the same form as the continued fever, the first fit frequently lasting three days without intermission. Physicians treat it nearly in the same manner as the last, but I have observed that they are very averse to taking blood from a patient afflicted with this disorder, say-

"* Lonicœra.

ing, that bleeding is a sure way to prolong the disease, although sometimes a small matter of blood is taken from people of a very gross habit of body, when the returning fits seem to continue longer in point of time than at the first. The same diet is observed as in the continued fever, except when the patient is very weak, when strong broths, well separated from the fat, are frequently given; if delirious, or comatose symptoms, with pains in the back, &c. make their appearance, cooling medicines are used, during the paroxysms, Dr. James' powder or other antimonials; and, on intermission, the bark in copious doses is administered with effect, and in obstinate head-aches recourse is had to blisters.

"This is a very tedious disease, and whoever is affected with it should not too soon judge himself cured, but continue taking a bitter infusion, composed of the bark of the root of the *magnolia major*, which the French on the Mississippi substitute in lieu of jesuit's bark, with Virginia heart, snake-root, rue, *sal absynth;* and pink root, in good Madeira or Lisbon wine.

"People in general, suppose them even obliged to remain on the sickly spot during the fatal season, which is autumn, may, by care, in a great measure shun this tedious illness, such as living on a more generous diet, especially animal food high seasoned, and a moderate glass of wine, avoiding a too great exposure to the then frequent sudden changes of air. They ought to use the cold bath often, wear garlic

and camphire in the pockets, not expose themselves to rain, and above all keep warm and dry feet, and if got wet by rain not to change their clothes too suddenly; never go out of a morning fasting, but before you go to work, business, &c. eat a piece of bread, and drink a glass of the bitter infusion; avoid the night air, and keep some fire in the house, particularly in the mornings and evenings, to rarify the damp air in the rooms, especially in the bed-rooms, which ought never to be on a lower floor, and should be in the eastern parts of the building, exposed to the morning sun. By observing these rules, the constitution of the human body will be less disposed to receive the impressions of a bad air.

" An excellent thing to be given the negroes on a plantation, before they go to work, is a wine glass full of the above bitter ingredients, and garlic infused in rum, and they should be encouraged to chew and smoke tobacco.

" When a person is seized with a fit of the ague, he ought by no means to delay going to bed, and drink a draught of lime juice and powder of chalk, while it is fermenting in the glass: this will bring on a sweat, and shorten the fit; or, in the hot fit, use some opiate, if the patient is not delirious: this ought to be done as often as the paroxysms return.

" The nervous fever, likewise called the slow fever, is known by a small, quick, and low pulse, and by not affecting the patient with such violent heats as the other fevers, but with greater oppression about

the *præcordium;* it does not make them so thirsty; the tongue is at first unusually moist, and looks white, though at last it becomes dry, and looks brown or inflamed; continual heats are felt in the palms of the hands, heats and chills return alternately very quick, a copious clammy weakening sweat, excessive lowness of spirits, restlessness, being drowsy without power of sleeping, pain and giddiness of the head, ringing in the ears, and, if it lasts long, the tendons are often affected with a sort of cramp; deafness, deliriums, continual lethargic fits; insensibility and stupor are the constant attendants of this disorder, when in its last stages.

"This is a most treacherous disorder; and by affecting the sufferer with only slight symptoms of weariness and weakness, attended with frequent yawnings and stretchings, a slight giddiness and loss of appetite, and a great heat in the forehead, makes people neglect an early application to the physician, and thus they endanger themselves much, though in people of a robust constitution, who are much exposed to the sun, it will often appear for the first day or two with violent symptoms. This fever will last sometimes for twenty days or more, without any apparent abatement. It generally attacks people who have been exposed to unusual fatigue, or such as are naturally of a weak constitution. Vomits are the remedy to which recourse is most usually had in this disorder.

" Physicians steadily and almost totally avoid bleeding and purging, till after a free use of the *ipecacuana*, and even then their cathartic prescriptions are rarely any other than manna and salts, and after the gentle purges obtained by this method, they order a free use of rich chicken broth, and the above-described juice of lemons, saturated with *sal absynth:* this they generally continue until the disease changes into an intermittent fever, and then treat it in the manner last-mentioned, frequently also applying blisters.

" This fever, more particularly than any other disorder, bears hardest on the patient towards sunset. The diet commonly prescribed is sago, chicken broth, and panado, with some small matter of wine and loaf sugar in the first and last. Infusions of sage and balm, together with wine whey, are the drink mostly thought proper, during the continuance of this disorder.

" The use of bark is generally blamed, as productive of dropsy, jaundice, the ague-cake*, and other inveterate chronical disorders, but it is certain that the bark is blameless; it is the fault of the physicians, who too late and with too much caution use this blessed remedy, which seems as purposely designed by Providence to relieve us in those tedious

" * A hardness in the region of the spleen, one of the consequences of long continued fevers, and by the Dutch Creoles distinguished by this name. They call it, in their own language, *kock in de buyck*, or simply *de kock*.

disorders ; or it is that of the patient himself, who, prejudiced against this excellent remedy, refuses to take it till it is too late, and thereby brings upon himself the above diseases, which are consequences of the fevers, not of this great specific.

" The above-mentioned fevers, and unusual hardships in travelling, &c. as well as excesses at plentiful tables full of variety, often bring on a severe bloody flux, especially in autumn, and if this makes its appearance with hard, dry, and bloody stools, the disease is dangerous. Brisk purges, and clysters of Castile soap, and some of the hot seeds are used to expel these ; when the desired end is obtained, gentle emetics are called in. I have known people find great relief from a decoction of logwood and pomegranate skins ; others again it would not help in the least ; a new honey-comb, inclosed in an apple scooped out, and then roasted before the fire, has often proved a speedy and very effectual remedy ; calcined hartshorn, a nauseous medicine, is nonsense; bark of *sumach* is a good medicine, but there being a dangerous kind, it ought to be gathered by a skilful hand ; the bark of the *liquidambar styraciflua*, *aceris folio*, together with the gum exuding from the same tree, is generally found efficacious ; a wine glass full of the juice of lemons, mixed with some common salt, has often proved a most excellent, safe, and general specific ; the frequent chewing of cinnamon and camomile flowers, especially when a weak stomach vexes the patient, has a noble effect ; avoid all

vegetable food, except rice; eat roasted rather than boiled flesh; salted beef need not to be avoided; use often veal, jellies, and salop; use a great deal of mustard; I know by the experience of many, as well as my own, that Dr. Barry's observation of vegetables not being so easily assimilated as animal food, is in the strictest sense universally true; and in an obstinate continuance of this disorder, vegetables, even our common wheaten bread, are not at all digested, but most generally pass through the body unaltered. When this disease changes into a chronic habitual flux, it will be necessary to use pills of equal parts of rhubarb and *ipecacuana*, mixed with some liquid opiate, and use weak lime water for common drink. If this does not prove a specific, let the patient be removed to some other clime, for no remedy will affect that disorder in the same climate where it was originally contracted. Claret or port ought to be their constant drink in this disease, and spirituous liquors ought by all means to be avoided: rum, a cursed bane of health and of society, is too often and indiscriminately applied to every disease, as a universal *arcanum*.

" The *cholera morbus* is likewise a consequence of intemperate meals, and when it is not occasioned by any food peculiarly repugnant to the stomach, it often proves fatal.

" Debauch of every kind, particularly unseasonable sitting up, is most frequently productive of some

of the most dreadful disorders, and excessive passions of the mind sometimes produce the same effects.

" Excess in venery is generally productive of the most violent and obstinate disorders, principally inflammatory fevers and obstinate fluxes.

" There is a disease which the French call *la tytanose*, which affects people in the western parts of Florida, and will attack them with prodigious violence upon being wounded, even in the slightest manner: if, during the hot months, a splinter be run into the flesh, the patients are attacked with violent contorsive spasms, and generally die in about eighteen or twenty hours.

" I never saw any person afflicted with this dreadful disorder, but from the similarity of the name with the Latin *tetanus*, and from my being told that opium and camphire are much used to procure relief, I take it to be the locked jaw, with which I saw a young man die at Mobile. Mr. Lind* recommends copious external applications of opium, and the cold bath, and gives some imperfect account of mercurial ointment having lately proved an efficacious remedy: the hint was perhaps necessary to be inserted here.

" *Angina suffocativa*, or the putrid sore throat, sometimes appears here. This is a contagious distemper, and rages in America mostly among the youth. It generally begins with a slow fever, attended with great lassitude and a low pulse. This is

" * Hot Climates, second edition, page 285—286.

succeeded by a sore throat, with white spots near the *uvula;* and if it be not immediately taken notice of, the patient soon becomes past hopes, and generally dies within twenty-four hours after the first severe attack of the fever. The physicians in Carolina and Georgia prescribe first mercurial purges, and order a gargle of borax, dragon's blood, and Armenian bole, in vinegar and honey; and the throat is anointed frequently, by help of a feather, with a mixture of balsam of sulphur, tincture of myrrh, honey, loaf sugar, and yolk of eggs. The principal part of the cure is to attend the disease early, the least neglect being dangerous.

"The dry belly-ache is a very painful and tormenting disorder, though rarely fatal. It is occasioned by cold damp lodgings, and being exposed to the night air, but most frequently, in all climates, by an excessive use of the vegetable acid juices, which are all extremely astringent in their nature: and when this disorder proceeds from too liberal a use of punch, rheumatic pains and paralytic affections of the nerves are its constant consequences and attendants, with loss of the proper use of limbs, often for life. The most usual symptoms are the vomiting of bile, with the most obstinate costive habit imaginable; and when stools are procured, the excrements are excessive hard, and in round balls like horse dung: all this is attended with the most excruciating pain in the bowels, and a clammy sweat. The method of cure is by administering emetics of the antimonial

kind, which often also procure a stool: this is the only thing that can relieve the poor sufferers; the warm steam of hot herb baths, clysters of the *tinct. Thebaic.* in luke-warm milk, and emollient plasters, in which opium enters, applied to the stomach and belly; bitter purging salts and manna, and infusions of senna leaves, after the middle vein is stript out of them; in the severe attacks of the pain, opiates are used, and too often that cursed arcanum of the vulgar among the English, I mean rum and other distilled spirits, which in this disorder too often prove fatal poisons; the oil of *palmæ Christæ*, by three or four spoonfuls, has sometimes proved effectual; oil of almonds and of olives have been given with success.

"After all medicines had failed, I once applied to a mulato woman, who was a noted empiric in the island of Curacoa, where I was attacked by this distemper. She ordered a clyster of sweet milk, tobacco, and brown sugar, which gave some slight relief, but after a while the painful symptoms of the disease seemed to be as excruciating as ever; she then gathered some handfuls of the leaves of a shrub which is there called *wild carpat;* these she boiled like spinnage, and made them into seven or eight balls of the size of walnuts, put them in a plate, and poured oil olive on them, and a little pepper; this kind of sallad she made me eat with a piece of bread, when I observed to her, that she ought to have added vinegar to have made a perfect sallad. She answered,

that vinegar in my case was poison. In half an hour after the use of this mess, a stool, the first in twenty-three days, was procured, which was followed by five or six more that very afternooon; and she then gave me for some days an intensely bitter mixture, in which I perceived the juice of aloes predominant, but could not learn the composition. This kept me in a lax habit of body, and in about fourteen days I was enabled to pursue my ordinary avocations. Camphire and opium enter into all the purgative prescriptions I have seen ordered in this disease, by the physicians of the south.

" There is an instantaneous fatal disorder, which the French call *un coup de soleil*, i. e. literally, a stroke of the sun. Of this I remember one instance, during my stay in West Florida, when it killed a child of about twelve years old on the spot, between the hours of eleven and twelve in the forenoon, the time, as I am informed, in which it always takes place. By instantly applying cold water to the crown of the head, I am told, its fatality is prevented; likewise by cupping the crown of the head. What its symptoms are I have not seen, but, by the descriptions, I take it to be a fever, which so violently attacks the patient, that it causes instant death. This disorder occurs very seldom, and as it is so very easily guarded against, persons who are attacked by it are in a great measure blameable for their own misfortune, particularly if they know the country. The French, one and all, put a single piece of clean writing paper be-

tween their hat and head, during the hot months, to ward off the attacks of the *coup de soleil.*

" These are the diseases which occur during the hot seasons. There is likewise a fever, in which the patient is continually affected with defluxions of the head. This appears in the late winter months, and during a wet spring: it is called a catarrhal fever. This disease is not frequent, but when it appears, it is generally treated like other fevers, except that bleeding is more freely used.

" The pleurisy also makes its appearance sometimes in winter. Moderate or copious bleedings from the arm, according to the degrees of violence of its attacks, are immediately used: if looseness and gripes attend the pain, blood is taken away often, and in small quantities; the patient is kept moderately warm, and on no account suffered to uncover; the first medicine is commonly a cooling purge; gentle sudorifics are likewise administered; frequent hot baths for the feet are also prescribed, but very cautiously applied, for fear of his catching cold. After the operation of purges and sudorifics, gentle antimonials are used, and a light easy digested diet, with infusions of hyssop, sage, or balm, follow in course; likewise swallowing of living wood-lice; and in case of costive symptoms, clysters are used; on the continuance of the pain in the side, a moderate blister or drawing plaster is put to the part; much coughing, which causes a watchfulness, is removed by opiates; in feverish symptoms, the disease is treated as the

other fevers; spirituous liquors are to be avoided by all means.

" During some winters, a *peripneumony* also visits a few people here: the method of cure is the same as for the pleurisy. It is said to be more dangerous than the pleurisy, particularly if copious bleeding is not made use of as soon as the patient is affected. In this disorder there is generally a freer access of air allowed than in the last, and the patient kept almost in a sitting posture. It is said that the steams of warm water drawn into the lungs in this disease is a powerful help.

" A compound of the two last disorders, called the *pleuro-peripneumony*, is likewise sometimes heard of, and is treated as the last.

" In Georgia I saw one or two instances of a disorder among blacks, to which the people give the odd name of the pleurisy of the temple, of the forehead, of the eye, and so on: I am told they have a pleurisy for every part of the head. It is violently acute, and, as I am informed, proves sometimes fatal in ten or twelve hours time, if, immediately on its attack, a quantity of blood is not drawn from the arm. For the rest, this disease is treated like a pleurisy.

" The chronic diseases are dropsies, consumptions, hemorrhoidal and habitual fluxes, relaxed and bilious habits of body, ruptures, worm-fevers, and, among blacks, the leprosy, elephantiasis, and body yaws: which last in Carolina is called the lame distemper. The first five of these are often best re-

moved by a change of air, as the most efficacious medicines often prove of no use against the obstinacy of the disorders, in the climate where they first originated.

" The dropsy most frequently seizes a patient after an obstinate intermitting fever, where the use of the bark has been too long delayed. In this disorder the ordinary prescriptions in these countries is syrup of squills, and the common diuretic salt; with these the patient is confined to dry food, and from spirituous liquors; such vegetables as turnips, radishes, &c. he is allowed to indulge in. Dr. Lind says, that exciting a slight salivation may be of help in a tolerable sound constitution: perhaps none of the chronic diseases are more relieved by change of climate than an obstinate dropsy. A consumptive habit of body, particularly where the cough is very obstinate and frequent, and when bilious stools, with a great hardness of the lower belly, affect the patient, or when a continual fever emaciates the poor sufferer, he is in a dangerous way, and a remove to colder climates is hardly adviseable. I have known such people relieved by making frequent short voyages to sea, in moderate climates; but unless proper remedies are also made use of during these voyages, the fever returns almost directly on re-landing. Frequently, after one or two of these voyages, the patient feels himself better. If he then retires to a milk diet, and freely indulges himself in fruits, utterly avoiding all manner of drugs and medicines, he may find relief, and even

a return of constitution. Frequent doses of flour of brimstone, and cooling the water he drinks with sal nitre, are of use during this course; likewise the patient ought with the greatest care to avoid exercise: the stiller he keeps himself, the more hopes of recovery there is. The fever which attends this disorder is of such a nature, that here the use of the bark must be carefully shunned, as it has been during long practice, and by frequent experiments of very able physicians, found to be a sure poison in this disorder.

"The Spaniards wear the nest of the great travelling spider sowed in a rag about their necks, as a sure way to assuage a hectic fever, and I think with great success. It is a matter of surprise to see how perhaps a thousand *animalculæ*, which are in perfect life in one of these nests, at the time of its being put round the patient's neck, will, in the course of about thirty hours, be perfectly pulverised by meer dint of the heat of the body, which these young spiders seem in a peculiar manner to attract. In hardness of the belly, in this disorder, most of the Creoles use hard and frequent rubbing it with a warm hand dipt in oil or hog's lard. *Quere:* bear's oil being so very subtle and penetrating, would it not be preferable in rubbing?

"The *hæmorrhoidal* flux is very frequent here, and was it not so very troublesome an attendant, it would be looked upon as a beneficial event. Persons who are attacked by it are generally certain of not

falling into the more dangerous diseases occasioned by obstructions of the viscera in hot climates. The greatest danger attending it is that of the patient falling into a habitual flux, which is a most tedious and troublesome disease, and that, although the patient has no other complaint but the frequent necessity of going to stool, and is but seldom troubled with an involuntary expulsion of the *fæces*, this disease is almost always a slow though sure harbinger of death, by its continuance for years, draining the very last drop of moisture from the sufferer, who, being left a mere skeleton, is, as it were, carried off in the manner of an expiring candle snuff. Yet those persons, who have been opened after death, have been found with all the inward parts perfectly sound, and thus the faculty is left in the dark, without any way to account for this disorder. I have heard of people of a very robust constitution, with whom it has continued above twenty years. No disease is so frequent. It almost always attacks people who have suffered much from frequent sickness or severe fatigue, and its obstinacy is such, that it will yield to no remedy whatever in the climate where it originated. I have myself been attacked by it, first in the province of Georgia, in consequence of the great fatigue I underwent, in my frequent long and wearisome journies by land. No astringent of any kind, not even the long use of rhubarb and *ipecacuana*; was of the least service to me; vain was every medicine against this obstinate malady. Opium was recommended to me as a spe-

cific; this I took at length in incredible doses, but the relief was only momentary; after the short reprieve obtained hereby, it returned with tenfold violence and obstinacy. If then I was unhappy enough to use opium during this attack, it was of no use whatever, but obliged me, for the next time, to seek respite from a double dose. The cold bath I found of some slight benefit; and when I was at the proper season in any part of Florida where the coco-plumb* grew in abundance, by freely eating this wholesome fruit I was relieved for that season; and no sooner was I obliged to abandon this excellent remedy, but the disease again prevailed. Thus was I harassed for about eight years, when I changed climates, by coming to New York. Here likewise all medical prescriptions failed, till at length I found that a decoction of the bark of *semi-ruba* and *terra japonica*, in the proportion of half an ounce of each to six pounds of water, being boiled down to one-sixth, was an effectual medicine after the change of climate, which last alone must not be relied on. One quart of the above decoction, in the quantity of a wine glass full, taken morning and evening, cured me; but relapsing again, after about three months, I got another quart, with the two first glasses of which I took a small pill of crude opium, and by two more glasses full I found myself again restored to my natural habit of body.

" * *Chryso Calanus.*

" An entire relaxation of the solids, and a bilious habit of body, is another common affliction of those who have suffered much by the diseases of hot climates. The constitution is in such people so decayed, that it seems as if every moment would be that of dissolution ; the stomach is weak, their complexion is nearly that of a sufferer by the jaundice, and hardly any food, especially greens and sallads, is found digestible. If the dry belly-ache has been their frequent attendant, a paralytic contraction of the limbs is the final consequence of that malady. Others again will vomit clear bile, and be very costive, having the abdomen exceeding hard. For all these complaints there is no better cure than a change of climate, and when the patient begins to feel any benefit from the difference of air while at sea, I would recommend a plentiful and constant use of camomile flowers, chewing them in the same manner as people do tobacco : this, however disagreeable to most palates at first, becomes in time as agreeable to the mouth as it is grateful to the stomach. The use of *elixir vitrioli*, in the quantity of fifteen or twenty drops, taken every morning fasting, and again an hour before dinner; and the moderate use of a glass of generous wine is not amiss to such sufferers. Animal food, especially mutton, is the most suitable diet, and, in case of an obstinate costiveness, use the *elixir aloes* often at night or in the morning. The cold bath, especially of salt water, is very beneficial to such sufferers.

" Ruptures are pretty much complained of on the banks of the Mississippi. I have observed likewise that they are a good deal frequent in Georgia and in Carolina. What can be the cause of a disorder of this kind being frequent I know not; but I find in a pamphlet, which gives a superficial description of South Carolina, the following way to account for it: ' The obstructed *viscera* being swelled beyond their natural size, the intestines are too much confined; and by nature of the aliment and bad digestion being frequently distended with wind, it is not to be wondered at that they often pass through the rings of the abdominal muscles.'

" The worm fever, which is common throughout all America, especially from Pennsylvania southwards, is not so common here as in Carolina, Georgia, &c. The reason I take to be because the sweet potatoe is not so universally used for food here as elsewhere; children suffer most with it, though it sometimes affects people of all ages. When a fever obstinately withstands all medicines, it may almost be depended upon that this obstinacy proceeds from worms. The stinking weed, which is known by the name of Jerusalem oak, and in those provinces is the most efficacious vermifuge, and the safest medicine, especially for children; a spoonful of the expressed juice of the whole plant, taken on an empty stomach, is found to be a sovereign antidote. The *lonicæra* I have already mentioned, as to its qualities. If the worms are suspected to be lodged in the *rectum*,

clysters of a decoction of tansey, onions, garlick, rue, wormwood, and such like, in milk, are of good effect; a plaster of pulverised aloes, oil of rue, or wormwood, with powder of the bitter gourd and ox-gal, applied to the navel, is also of good effect. I would recommend the use of animal food, particularly rich fish soups, highly seasoned with garlic or onions, and it will be proper to avoid all kinds of farinaceous vegetables, except wheaten bread: above all, the potatoe and pumpkin ought to be shunned as poison.

" A loathsome disease appears sometimes among the negroes, after severe acute disorders, especially if the patient has been obliged to keep his bed long, likewise after a violent exercise has brought on a surfeit. This is called the *elephantiasis* from the swelling of the feet and legs: it is most frequently seen to affect one leg only. In the first stages of this disorder, the patient becomes wretched through excessive lassitudes, which bring on an emaciation of the body; then the corrupted juices subside into the leg or legs, and feet; these swell, the skin becomes distended, shines and shows the distended veins every where below the knee; now the skin by degrees loses its gloss, and becomes unequal and something scaly; after this chaps make their appearance, the glands are stretched, and the scales are daily enlarged, appearing as hard and callous as the hide of an alligator, notwithstanding which, the slightest

prick of a pointed instrument will cause the blood to exude. This disease affects neither the appetite nor the digestive powers of the body; on the contrary, the patient, in this and cheerfulness of spirits, resembles the healthiest of men, and the inconvenience of his heavy leg only prevents his ability for the more laborious part of his duty.

" No manner of cure has yet been found for this cruel disorder, but the patients often live to a very advanced age under the pressure of its yoke, even when it has been contracted in early youth. It is said that the amputation of the affected limbs is no cure, for the disease will immediately attack the sound leg. This I find also asserted by *Hughes*, in his Natural History of Barbadoes.

" I have seen three or four instances of the disease called body yaws in the islands, and in Carolina the lame distemper. This is said to proceed from hereditary venereal taints. It appears in cancerous corroding sores in the mouth and throat, and spreading ulcers, together with fleshy protuberances, chiefly on the face, breast, and thighs, with a swelling of the skin and knee-bones, and commonly corrodes the cartilages of the nose. Its first symptoms showing themselves about the throat and palate, have caused ignorant people to mistake it for the *angina suffocativa* before-described. Mercurial medicines are used against it, afterwards diet drinks of China root, nut-grass, &c. The sores in the mouth are often to be

rubbed with a feather dipt in syrup of roses, to an ounce of which two drops of *sp. vitr.* have been added. Unctuous, salt, spiced meats, and spirituous liquors, are absolutely to be avoided; frequent sweats are also prescribed, and a great care against catching cold.

"The leprosy so called; whether the same as was the cause of proscription to the unhappy patients, under the Mosaic laws, I shall not pretend to determine: certain it is, that it is a nauseous, loathsome, and infectious disease, sometimes seen among the blacks. This appears first with the loss of beard and hair from the eyebrows, swelling of the lobes of the ears, the face begins to shine, and brown protuberances appear thereon, the lips and nose swell to a monstrous size, the fingers and toes will in the end drop off, and the body becomes at last so ulcerated, as to make the poor incurable patient really a miserable object of pity."

To these ample quotations I shall only add, that the author confirms the principal circumstances of the shipwreck of Pierre Viaud and madame La Couture, which took place on the shore of Apalachicola: but when they came to relate their adventures, they turned them into a romance. The eggs they found were those of the tortoise, and not, as they tell us, turkies' eggs. He mentions persons by whom these two sufferers were assisted after their shipwreck. It is much to be regretted, that a book, con-

taining such various, authentic, and useful information, has not been translated into French*.

* We may also express regret that it has not been republished in its native language. The vicinity of Florida to the United States, and the probability of its being incorporated with our territory, in a little time, would render its contents uncommonly interesting to the present, and still more so to the next generation. —TRANS.

No. III.

On the History of New Hampshire, by Jeremiah Belknap, and the History of Vermont, by Samuel Williams.

I.

MR. BELKNAP'S History of New Hampshire, to which I have often referred, and which has not been translated into French, is published at Boston, in three octavo volumes. The history of the colony is given in the first and second volumes, and the picture he draws is more worthy of attention, because it shows the original of many customs, which, though first created by positive laws, have since become inveterate habits, and form the most intimate ingredients in the character of the people.

This history displays, in strong colours, the austere spirit of the early colonists, who imposed the most rigid restraints on the intercourse between one sex and the other, and even between those of the same sex; on the forms of courtship; on the looks and behaviour at home and abroad; on the carriage of the head, the eyes, and the limbs: whence have proceeded that ceremonious tone, those grave and silent airs, and all

those prim formalities which still distinguish the females of the *United States**. Women were prohibited from exposing their arms and necks; the raiment was to descend to the wrist, and ascend to the chin. Men were obliged to cut their hair short: drinking healths was forbidden, as a rite of idolatry; and it was a crime to brew on Saturday, because the liquor might *work* on a Sunday†. Disobedience to *any* of these precepts exposed the culprit to legal process and condign punishment; a real inquisition was established; and all the habits generated by religious persecution took root in the minds of the people: among these were taciturnity, reserve, hypocrisy, the habits of system and union‡, with *energy of resolution and resistance after patience has been exhausted.* This work is useful and interesting, on account of its moral views

* What a groundless and extravagant inference! Mr. Belknap's history relates only to New Hampshire, or, at furthest, to New England. The rest of the United States arose from very different beginnings. The founders of Maryland were Romanists; of Virginia and the Carolinas episcopalians; of New York Hollanders; of Pennsylvania quakers, whose early laws and manners were total strangers to what is here recorded; and, even in New England, these austere laws have been long ago consigned to oblivion and contempt.—TRANS.

† This trite and wretched *pun*, so evidently a mere joke, is here stated gravely, as a fact and a law. Volney could not have gotten this from Belknap, though the context implies as much, but has heard it, as most travellers have done, in a string of other jests in a stage coach.—TRANS.

‡ Combinaison d' idées et de plans.—V.

and its laborious authenticity; but the multitude of minute particulars, of no concern or interest to us, would perhaps scarcely warrant the pains of translation.

The third volume bears a very different stamp. It contains a regular description of this district, its climate, soil, and productions, its trade and agriculture, and, in fine, every thing relative to the condition of the country. This part of the work may be compared to Mr. Jefferson's account of Virginia. In both we find as extensive and accurate a statistical account of the states of which they treat, as could be expected from the zeal and labours of a single individual. Mr. Jefferson, whose work appeared in 1782, has the credit of first leading the way, and of surmounting the chief difficulty, in first tracing a design till then new*. Mr. Belknap's work appeared ten years afterwards, and had thus the opportunity of profiting by the facts and methods acquired in the progress of the statistical science. This volume, of 480 pages, is capable of some abridgment, as many particulars are uninteresting to us. If we overlook some effusions of prejudice, natural to the author's character as an American and clergyman, and which show themselves in declamations against the philosophers and travellers of Europe, his work is one of

* The forming a plan of enquiry, and distributing a subject into proper parts, hardly deserves the name of the *chief difficulty*. Any ingenious mind can perform this, but to fill up the outline, *hic labor, hoc opus est*.—TRANS.

the most instructive and philosophical with which America is capable of enriching our language.

II.

The praise I have given to Mr. Belknap is likewise justly due to S. Williams, who published, in one volume, octavo, of 400 pages, a History, Natural and Civil, of Vermont. The book is divided into seventeen chapters. The first six chapters describe the situation, boundaries, surface, soil, mountains, caverns, springs, rivers, lakes, climate, seasons, and vegetable and animal productions. The seventh and eighth chapters treat of the character, manners, and condition of the Indians. The three next chapters detail the history of the state, and the rest of the work discusses the occupations of the people, their manners and customs, connected with education, marriage and social life; their religious spirit and establishments; their mode of government, population, and notions of civil liberty: the last of which he thinks chiefly owing to the situation and condition of the people.

Mr. Williams may sometimes be thought too minute and circumstantial, but the information he conveys is, in many respects, so valuable and authentic, that I consider this book as the principal means of diffusing natural knowledge among the people of America. I procured a literal version of it, as well as the

third volume of Belknap, with a view of finally turning it into good French; but I have since been induced to relinquish this design, not only by the weak and precarious state of my health, but by information that the task is undertaken by a person who will soon publish the result of his labours*.

* The true method of translation I take to be this. We should first turn the foreign book into words as exactly and literally answering to those of the original as possible. As the idiom of our own tongue would, in such a process, be lost and confounded, we should lay it aside for some time, and, when the original is forgotten, we should take up our literal version, and, by correcting and new modelling the style, we may be able to produce an *excellent* performance, as well as a faithful translation. To make even a tolerable translation is no easy undertaking.

No. IV.

Gallipolis, or the French colony at Scioto.

A CERTAIN association, called the Scioto Company, proposed, at Paris, in 1790, with much parade, the sale of some lands in the best part of the United States, at 120 cents an acre. They dealt out the most liberal promises and charming prospects, such as people are generally accustomed to offer on these occasions. "A climate wholesome and delightful, frost, even in winter, almost entirely unknown, and a river called, by way of eminence, the *beautiful*, and abounding in excellent fish, of a vast size. Noble forests, consisting of trees that spontaneously produce sugar *(the sugar maple)*, and a plant that yields ready made candles *(myrica cerifera)*. Venison in plenty, the pursuit of which is uninterrupted by wolves, foxes, lions, or tygers. A couple of swine will multiply themselves a hundred fold in two or three years, without taking any care of them. No taxes to pay, no military services to be performed."

These munificent promisers forgot to say, that these forests must be cut down before corn could be raised; that for a year at least they must bring their

daily bread from a great distance; that hunting and fishing are agreeable amusements, when pursued for the sake of amusement, but are widely different when followed for the sake of subsistence: and they quite forgot to mention, that though there be no bears or tygers, in the neighbourhood, there are wild beasts infinitely more cunning and ferocious, in the shape of men, who were at that time at open and cruel war with the whites.

In truth, the market value of these lands, at that time, in America, was no more than six or seven cents an acre. In France, in Paris, the imagination was too heated to admit of doubt or suspicion, and people were too ignorant and uninformed to perceive where the picture was defective, and its colours too glaring. The example, too, of the wealthy and reputedly wise confirmed the popular delusion. Nothing was talked of, in every social circle, but the paradise that was opened for Frenchmen in the western wilderness; the free and happy life to be led on the blissful banks of the Scioto. At length Brissot published his travels, and completed the flattering delusion: buyers became numerous and importunate, chiefly among the better sort of the middle class: single persons and whole families disposed of their all, flattering themselves with having made excellent bargains at a crown an acre, because in France, near Paris, good ground was worth above eighty or a hundred crowns. Each one set off, in his own time, from

some French ports, in the course of 1791, and Paris heard no more of these adventurers.

On my arrival in America, in October, 1795, I made some enquiry after these people, but could only hear a vague story that they were buried somewhere in the western wilds, and had not prospered. Next summer I shaped my course through Virginia, and after travelling three hundred miles to Staunton, two hundred more, over a rugged desart, to the Great Kenhawah, and sixty miles down that river, through a scene still more dreary and desolate, to the Ohio, I at last reached a village called Point Pleasant, four miles from Gallipolis: by this splendid appellation (which means *French city*) the emigrants denominated their settlement. My eagerness to see the face and hear the the language of my countrymen, once more, made me hasten thither without delay.

Colonel Lewis, a kinsman of general Washington, facilitated my journey. I went on, but reflecting that I was going to visit Frenchmen, disappointed in their dearest hopes, their vanity mortified, and their mortification likely to be aggravated by the sight of one, who had probably foretold their misfortunes to some of them, my impatience was greatly diminished. It was night-fall before I reached the village, and I could perceive nothing but a double row of small white houses, built on the flat top of the bank of the Ohio, which here laves the foot of a cliff fifty feet high. The water being low, I climbed the bank, by a slope formed in its side, and was conducted to a log house

called an inn. It was kept by a Frenchman, who asked me but few questions, and his demeanour evinced the truth of all my prognostics.

Next day I took a view of the place, and was struck with its forlorn appearance; with the thin pale faces, sickly looks, and anxious air of its inhabitants.—They were shy of conversing with me. Their dwellings, though made externally cheerful by whitewash, were only log huts, patched with clay, and roofed with shingles, consequently damp, unwholesome, and uncomfortable. The village forms an oblong quadrangle of two rows of contiguous buildings, which a spark would consume altogether. This, with many other faults, they owe to the negligence of the company. Adjoining these huts are gardens, fenced with thorn, destitute of trees, but well stocked with useful vegetables. Behind these gardens runs a creek, nearly parallel to the river, which makes the scite of the town nearly a peninsula. This creek, at low water, shows a bottom of black mud, and the overflowings of the river run up this creek, and spread themselves over some pestiferous marshes. South-east lies the broad expanse of the river, but in front and to the north there appear nothing but interminable forests. Above the town, the clayey and tenacious soil retains the rain water, and forms marshes, extremely unhealthful in the autumn. From July to November intermittents are extremely prevalent.

I met with nobody who had known me before, but their confidence was easily obtained, and I collected

from several persons the following history of their disastrous expedition.

About five hundred mechanics, artists, and tradesmen, in easy circumstances, and of good morals, arrived, in 1791 and 1792, at New York, Philadelphia, and Baltimore, from France. Each paid twenty or twenty-four guineas passage money, and their journies by land, in both hemispheres, cost them an equal sum. Thus dispersed, without any common plan of operations, they made, separately, their way towards Pittsburg and the Ohio, where their new home was situated. After many mistakes on the road, and a great waste of time and money, they reached a point, marked out upon a map, where the company had erected barracks for their accommodation. This company soon after became bankrupt, failing in its payments to the Ohio company, the original proprietors.—These, of course, not deeming themselves bound by the engagements of their debtors, refused the land to the emigrants. A vexatious law suit was the consequence, the more distressing to them, as their money was now exhausted. The United States were at war with the Indians, who disputed the right of the former to this very district. After the defeat of St. Clair, the savages blockaded the poor Frenchmen in their settlement, made captives of four, and scalped a fifth, who survived this dreadful operation.

Despondency overwhelmed them: some of them forsook the fatal spot, and withdrew into the country better peopled, or passed into Louisiana. At last,

after four years of dangers, hardships, and vexations, the poor remnant obtained a tract of 912 acres, for a new advance of 1100 dollars. This *boon* they owed to a son of general Putnam, who benefited them in a still more signal and disinterested manner, by refusing 1200 dollars offered by two Frenchmen, with a view of getting the whole into their own hands, and then extorting an exorbitant price from their companions.

They were again fortunate in receiving, from the congress of 1795, a gratuitous present of 20,000 acres, opposite Sandy Creek. This bounty was the more remarkable, because the animosity against France, which broke out the next year, began already to prevail in that assembly. Of this land 4000 acres belonged to those whose activity had promoted the gift, and the rest was distributed among eighty-two or eighty-four persons who remained.

When I paid my visit, only a year had elapsed since this arrangement had been made, and the settlement had already begun to revive and prosper, in such a manner as showed what great things would have been effected, had not its progress been checked by such heavy misfortunes. Still the situation of the colonists was far from being agreeable. All the labours of clearing and tillage were imposed on the family itself of the proprietor, labourers not being to be hired but at enormous prices. It may easily be imagined how severe a hardship it was, on men brought up in the ease and indolence of Paris, to chop trees, to plough, to sow, to reap, to labour in the field or the barn, in

a heat of 85 or 95 degrees. It is true, the soil was fertile, and the season propitious. In autumn and winter, venison was a cent or two a pound, and bread was two or three cents; but money was extremely scarce. The maple, tapped in February, afforded those who attended to the produce perhaps a hundred pounds of coarse dark sugar, frequently injured in the boiling, and extremely impure. The islets of the river afford a low creeping vine, with a tolerably sweet red grape, supposed to have been propagated from those planted by the French at Fort Duquesne, the seeds of which might have been brought hither by the bears, who are fond of grapes; but the liquor of this species differs little from that of the indigenous vine, which climbs trees sixty feet high, and bears a small, hard, and black grape. Swine have been of great use to them, and they have learned to cure the meat so well, that, in this journey, I consumed a whole ham, which had only been well smoked, but which I supposed to have been boiled. Some, with reason, prefer them in this state, for the lean part, when not too much salted, or when soaked in water, is confessed to be more wholesome, in hot climates, than beef.

Such is the condition of the Scioto colony, which does not altogether realize the pictures of the inland paradise given by American farmers, nor the glories of the future capital of the Ohio and its realms, predicted by a certain writer. If such encomiasts could hear their praises as they are rehearsed on the spot,

they would grow disgusted with that trite, idle, and inflated rhetoric, which has condemned five hundred meritorious families to hardship and misery.

Throughout America I have heard Frenchmen bitterly complaining of their treatment. It must, however, be acknowledged, that their calamity may be, in some degree, ascribed to their own infatuation and temerity, which refused to take warning by the cautions or sufferings of others; that their deceivers did not debar them from the means of better information; and that their credulity swallowed manifest chimeras and impossibilities. When it is added, that, even since my return, there have been adventurers who shut their ears and their eyes against conviction, and assiduously avoid hearing the truth, we must confess that such rashness and credulity almost necessarily give birth to the arts of mercenary speculators*.

I wished to leave this settlement with a persuasion that they were doing well and would prosper: but,

* To resist the arguments or authority of Volney seems, in this place, to warrant, in his opinion, the sufferings that overwhelm the poor deluded emigrant. The desire of bettering our condition, and the confidence inspired by plausible deceivers, whose council coincides with our own wishes, is an ample apology for the credulity or obstinacy here complained of. Nothing less than a miracle could arm the inexperienced mind of a Paris shopkeeper against the delusions that were practised upon him. The dreams of the Scioto colonists were some of them even ludicrously extravagant, and yet the dreamers themselves were some of them people of capacity and education.—TRANS.

besides the original and incurable error in the choice of situation, I am afraid that their despondency will never be entirely removed, since there will always be some cause for it, and since the French nation are less qualified for settling a new country than the emigrants from England, Ireland, or Germany. Among fifteen instances of farms, cultivated or formed by Frenchmen, which were mentioned to me in America, only two or three were likely to thrive. As to collecting men in villages, such as Gallipolis, those that have been formed on the frontiers of Louisiana or Canada, and have been left to shift for themselves, have generally dwindled, and sooner or later disappeared; while plain men, from the British isles or Germany, who have pierced the heart of the forest with their families only, and even ventured alone into the Indian territory, have generally made good their footing, and have prospered and multiplied.

An example of this truth is to be found in the history of the French settlement at Vincennes, on the Wabash, which I visited after leaving Gallipolis. I was prompted to more careful observations at this place, because I not only felt a general interest in the welfare of these my countrymen, but was anxious to know what kind of asylum these regions were adapted to afford to those natives of France who might hereafter be inclined or obliged to take refuge in them.

No. V.

Of the French Colonies on the Wabash, the Mississippi, and Lake Erie.

HAVING descended the Ohio, by Preston, Washington*, Charleston (Kentucky), and Cincinnati, I arrived at Louisville, about 350 miles from Gallipolis. Through this vast extent of country, I scarcely met with five infant villages, and eight farms. Louisville (Kentucky) has about a hundred houses, and is two miles above the falls, more properly the *rapids*, of the Ohio, which I passed over in a boat. I waited here eight hours, till a caravan was collected of four or five horsemen, necessary to travel upwards of 100 miles of woods and meadows, so desart as not to contain a solitary hut.

* There are above sixty places in the United States that bear the name of Washington. There are also a dozen Charlestons. Indeed, the geographical denominations of this country are borrowed from proper names, or from those of Europe, because the settlers are naturally fond of giving to their new abode the name of their native spot. And thus America has become a kind of second, though, as yet, by no means an improved, edition of Europe, especially of England and Germany. This circumstance will be more conspicuous a century hence.

After a hasty march of three days, we reached (August 2, 1796) Vincennes, on the Wabash. The eye is at first presented with an irregular savannah, eight miles in length by three in breadth, skirted by eternal forests, and sprinkled with a few trees, and abundance of umbelliferous plants, three or four feet high. Maize, tobacco, wheat, barley, squashes, and even cotton, grow in the fields around the village, which contains about fifty houses, whose cheerful white relieves the eye, after the tedious dusk and green of the woods.

These houses are placed along the left bank of the Wabash, here about two hundred feet wide, and falling, when the waters are low, twenty feet below the scite of the town. The bank of the river is sloping towards the savannah, which is a few feet lower: this slope is occasioned by the periodical floods. Each house, as is customary in Canada, stands alone, and is surrounded by a court and garden, fenced with poles. I was delighted by the sight of peach trees loaded with fruit, but was sorry to notice the thorn apple, which is found in all the cultivated places from beyond Gallipolis. Adjoining the village and river is a space, enclosed by a ditch eight feet wide, and by sharp stakes six feet high. This is called the fort, and is a sufficient safeguard against surprises from Indians.

I had letters to a principal man of the place, by birth a Dutchman, but who spoke good French. I was accommodated at his house, in the kindest and

most hospitable manner, for ten days. The day after my arrival a court was held, to which I repaired, to make my remarks on the scene. On entering, I was surprised to observe the audience divided into races of men, in person and feature widely differing from each other. The fair or light brown hair, ruddy complexion, round face, and plump body, indicative of health and ease, of one set, were forcibly contrasted with the emaciated frame, and meagre tawny visage of the other: the dress, likewise, of the latter denoted their indigence. I soon discovered that the former were new settlers from the neighbouring states, whose lands had been reclaimed five or six years before, while the latter were French, of sixty years standing in the district. The latter, three or four excepted, knew nothing of English, while the former were almost as ignorant of French. I had acquired, in the course of a year, a sufficient knowledge of English to converse with them, and was thus enabled to hear the tales of both parties.

The French, in a querulous tone, recounted the losses and hardships they had suffered, especially since the last Indian war, in 1788. Between that period and the peace of 1763, when England obtained Canada, and Spain Louisiana, they enjoyed tranquillity and happiness, under the protection of Spain. Unmolested and sequestered in the heart of the wilderness, fifty leagues from the nearest post on the Mississippi, without taxes, and in friendship with the Indians, they passed their lives in hunting, fishing,

trading in furs, and raising a few esculents and a little corn for their families. Many of them had intermarried with the Indians, whose amity was by these ties secured and strengthened, and their numbers amounted to three hundred persons.

During the revolutionary war, their remote situation exempted them from all its evils, till, in 1782, they were visited by a detachment from Kentucky, who plundered and insulted them, and killed or drove off the cattle which formed their chief wealth.

The peace of 1783 gave them to the United States, under whose benign government they began to breathe again; but unluckily an Indian war commenced in 1788, and siding with the whites, as duty and discretion enjoined, they were annoyed by the savages, whose animosity was embittered by the remembrance of their ancient friendship and alliance. Their cattle were killed, their village closely beset, and, for several years, they could not carry the plough or hoe a musket shot from their huts.

Military service was added to their other hardships; but, in 1792, the compassion of the federal government gave four hundred acres of land to every one who paid the capitation, and a hundred more to every one who served in the militia. This domain, so ample to a diligent husbandman, was of little value to the hunting Frenchmen, who soon bartered away their invaluable ground for about 30 cents an acre, which was paid to them in goods, on which an exorbitant profit was charged. This land was of the best

quality; it sold, as early as 1796, at two dollars an acre, and I may venture to say is now worth at least ten. Thus, for the most part, reduced again to their gardens, or the little homestead which was indispensable to their subsistence, they had nothing to live on but their fruit, potatoes, maize, and now and then a little game; and, on this fare, no wonder they became as lean as Arabs*.

They complain that they were cheated and robbed, and especially that their rights were continually violated by the courts, in which two judges only out of five were Frenchmen, who knew little of the laws or language of the English. Their ignorance, indeed, was profound. Nobody ever opened a school among them, till it was done by the abbe R. a polite, well educated, and liberal minded missionary, banished hither by the French revolution. Out of nine of the French, scarcely six could read or write, whereas nine-tenths of the Americans, or emigrants from the east, could do both. Their dialect is by no means, as I had been previously assured, a vulgar or provincial *brogue*, but pretty good French, intermixed with many military terms and phrases, all these settlements having been originally made by soldiers. The primitive stock of Canada was the regiment of Carignon.

* This implies that hunger or spare diet makes them lean, but this is evidently absurd. They cannot want plenty of the best food, and are probably greater eaters than their sleek and jolly neighbours. Their thinness must be owing to their constitution or their activity.—Trans.

I could not fix with accuracy the date of the first settlement of Vincennes ; and, notwithstanding the homage paid by some learned men to tradition, I could trace out but few events of the war of 1757, though some of the old men lived before that period. I was only able to form a conjecture that it was planted about 1735.

These statements were confirmed, for the most part, by the new settlers. They only placed the same facts in a different point of view. They told me that the Canadians, for by that name the French of the western colonies are known among them, had only themselves to blame for all the hardships they complained of. We must allow, say they, that they are a kind, hospitable, sociable set, but then for idleness and ignorance, they beat the Indians themselves. They know nothing at all of civil or domestic affairs : their women neither sow, nor spin, nor make butter, but pass their time in gossipping and tattle, while all at home is dirt and disorder. The men take to nothing but hunting, fishing, roaming the woods, and loitering in the sun. They do not lay up, as we do, for winter, or provide for a rainy day. They cannot cure pork or venison, make sour crout or spruce beer, or distil spirits from apples or rye, all needful arts to the farmer. If they trade, they try by exorbitant charges to make much out of a little ; for *little* is generally their *all*, and what they get they throw away upon the Indian girls, in toys and baubles. Their

time is wasted too in trifling stories of their insignificant adventures, and journies *to town* to see their friends*.

When the peace of 1793 incorporated them with the United States, their first demand was a *commanding* officer, and hard it was to make them comprehend the nature of elective or municipal government.—Even now they have nobody fit to govern the rest. They will not learn English, and it is not worth while for us to learn the language of eighty or ninety people, who may leave us to-morrow for Louisiana. Indeed they would be wise in doing so, for their indolence will never be a match for our industry.

From all accounts, the state of things is similar to this in the Illinois and Upper Louisiana. Apathy, indolence, and poverty equally prevail among the French settlers at Kaskaskias, Cahokias, Rocky Meadows, St. Lewis, &c. These qualities they in some degree derive from the nature of their government. This, both with French and Spanish, is purely military, the commander being a mere *aga*, who grants and takes back at pleasure all the liberties of trade, foreign and domestic. All commerce and property hang upon his will and caprice, and, to enrich a few favourites or relatives, the rest are condemned to poverty and misery. It is a perfect Turkish government, except that it is not, as formerly, sanguinary or prone to punishment.

* Thus they speak of New Orleans, as if it were a walk of half an hour, though it is fifteen hundred miles down the river.

This state of things will, in some degree, be accounted for by the situation of the first settlers, who were either soldiers by profession, or made so by their frequent wars with their white and red neighbours. They were thus habituated to a life alternately active and idle, and made to prefer the slothful and precarious existence of the savage, to the steady habits and laborious uniformity of the husbandman. Hence it is that, of late years, when the *Americans** introduced themselves among them, their industry has quickly gained the superiority, and, in five or six years, they

* The want of a peculiar geographical appellation, and their superiority in numbers and importance to every other nation, exotic or indigenous, of America, has given to the people of the United States the name of "Americans," among their neighbours and among Europeans. The largest or most important *part* is naturally confounded with the *whole*, and the name of the latter bestowed upon the former. Instead of regretting this circumstance, as some ingenious men have done, I think it rather a cause of pride and exultation. We should exult in the pre-eminence which this custom tacitly allows us, and ardently anticipate the period, when the extension of our empire will make the national appellation of *Americans* a strictly geographical and precise one. The complaint of present ambiguity in this term seems to be without foundation; for though the whole continent is called America, and the proper name of its inhabitants, therefore, Americans, the occasion on which these words are used always thoroughly explains the sense, either wide or narrow, in which they are designed to be taken. There are very few words which have not several acceptations, but they are used without the least danger of ambiguity. One of these words is *paper*, which has a greater number of meanings than almost any other word, and is sometimes comprehensive and sometimes limited. "My paper"

have become almost the sole proprietors. The French colonists, reduced to distress, have sold their lands for a trifle, as at Vincennes, and so rapidly were they supplanted, that, in 1796, almost all the district of Kaskaskias belonged to the house of E., and that of V. owned, in other places, 60,000 acres of land.

On the west side of the Mississippi the Spaniards, to augment the value of their lands, granted them to such emigrants from the United States as would naturalize themselves, and, in consequence, the old French settlers have been quite supplanted by the new comers, in trade and agriculture, and, gradually vanishing before them, retire into Canada or Lower Louisiana. Two of my fellow travellers, in Kentucky, were emigrating to the Missouri. They told me that upwards of eight hundred of their countrymen were already fixed in the country; and if lands continued to be granted *in fee*, three or four thousand families would hasten thither from Kentucky, where land was grown dear, and titles were doubtful.

I intended to bear them company as far as St. Lewis, 180 miles from Vincennes, but accidents prevented my journey. I was obliged to trust to the evidence of many who travelled through this country this and the four preceding years. According to their re-

is a simple phrase, but is perfectly understood, always in a sense peculiar to each, when uttered by a paper-maker, a merchant, a gazette printer, or an upholsterer.—TRANS.

presentations, from Vincennes to Kas *(Kaskaskias*)* is a journey of forty-three hours, computed by Arrowsmith at 160 miles.

The steps in this journey are detailed in the following table:

Road from Fort Vincennes to Kaskaskias.

	Miles.	Hours.
To Ombra creek -	9	2
To the Elm in the meadow	13½	3
To Cat river - -	13½	3
To the Yoke - -	15	3
To the Salt spring -	6	1½
To the Slave's gibbet -	15	3
To Great Point -	15	2½
To the Coffee-pot -	12	2
To the Yellow bark -	15	3
To Walnut point -	15	2½
Beyond this is a beaver dam, destroyed. At a cross road you take the left, which is shortest. There is no water for fifteen miles, and you fall into the main road at *Pointe aux Fesses.*		
To the Dam - -	4½	1
Carried forward	133½	26½

* This useful licence, in cutting off the superfluous syllables of long names, has many examples in America, besides the above: as Makinaw for Machillimachinach, and Ty for Ticonderoga.—Trans.

	Miles.	Hours.
Brought forward	133½	26½
To the three-thorned Acacia	12	2
To Pointe aux Fesses -	15	3
To the Meadow of the Hole -	15	3
To the Great Rib -	15	3
To Lepronier - -	12	2
To Kas - -	18	4
Totals	220½	43½

Beyond Ombra we enter a Tartarian meadow, interspersed with clumps of trees, but in general flat and naked, and windy and cold in winter. In summer it is filled with tall and strong shrubs, which brush the legs of the rider in his narrow path so much, that a journey out and back will wear out a pair of boots. Water is scarce, and there is danger of being bewildered, as happened to one of my fellow travellers, three years before, when, with two others, he roamed about for seventeen days. Thunder, rain, gnats, and horseflies, are very troublesome in summer. Five years ago, you could not fail of meeting, in these meadows, with herds of four or five hundred buffaloes, but now there are none. The hunters and the bells of the tame cattle have driven them beyond the Mississippi, which they crossed by swimming.

At the end of these meadows, near the Mississippi, is the district of *Kas*. The village is seated in a close sultry valley. It has dwindled so much, that

scarcely twelve Canadian families are left; yet, in 1764, Bouquet counted 400 inhabitants. On the opposite side of the river was formerly the large village of St. Genevieve, noted for a salt spring; but the annual floods have swept it away, and the people have retired to the upland, two miles off, where each one occupies a board house on his own land. Twelve or thirteen miles above, on the same side with Kas, was Fort Chartres, built of stone, with unusual magnificence. This has also been destroyed by the river, which has already undermined a bastion of New Madrid, which was founded in 1791, opposite the mouth of the Ohio, and 600 feet from the Mississippi. A great part of this fort will probably be washed away by the next floods.

The magnificent Mississippi, decorated by Mr. B. with all the charms of a land of promise, is a most mischievous neighbour. It rolls along, a mass of yellow muddy water, a mile and a half wide, which it annually lifts twenty or twenty-five feet above its banks, and deluges with it a loose soil of sand and clay; forms islands and destroys them; throws trees upon one side, and uproots them on the other; submitting its course to obstructions of its own creating; and at length overwhelms the spot which you thought the most secure. The sublimity of this stream is like that of most other grand agents in nature, to be admired safely only at a great distance.

This is not all: its damp and sultry precincts, in summer and autumn, engender obstinate fevers.

Such is the situation of *Rocky Meadows*, a village of ten families; of Cahokia, or Caho, which has about forty, instead of twice that number, who dwelt there in 1790. Opposite Caho, on the west bank, is St. Lewis, or Pancore, a compact town of seventy houses, with a well-looking but useless stone fort, spreading over two acres, with half a dozen wealthy families, five hundred poor, idle, and sickly whites, and a few blacks, the property of the rich, who treat them well. The Spanish code is more lenient and benignant toward the negroes, than the colonial system of any other nation. This, however, did not prevent an insurrection in Lower Louisiana, in 1791. In consequence of this, all the whites in Upper Louisiana were numbered and enrolled, and found to amount to five hundred. Colonel Sergeant, a man of talents, and high in office in the North-western Territory, who, in 1790, inspected the settlements in the Illinois, assured me, that the French families did not exceed a hundred and fifty. The whole population of what is called Upper Louisiana may, therefore, be reckoned at twenty-five hundred, including seven hundred capable of bearing arms.

These accounts differ, it is plain, very widely from those that have lately circulated at Paris, where this country was described as on the eve of bursting into a mighty empire: but my statements are received from witnesses upon the spot, who had no interest to mislead them, or induce them to mislead others, and I publish them with candour, and without any desire

of preventing others from examining for themselves. I am too well satisfied with this conduct to relinquish it*.

I have bestowed much reflection on the causes of the great decay of the French settlements in North America, for even in Canada their progress, if compared with that of the Americans, is a sort of decay†. It must not be admitted, as is maintained by some, that the French cannot bear the climate so well as their neighbours. The experience of Rochambeau's army proved that the French were more able to sustain cold, heat, hardship, and vicissitude than their allies. It seems to me that our fibre is more vital and elastic; and this natural advantage is improved by our more wholesome regimen. Besides their erroneous diet, as mentioned before, the *Americans* are scarcely less addicted to liquor than the savages; and in Wayne's army it was remarked, that the water drinkers held out better than the drinkers of spirits; and as to the Indians, spirits are well known to kill them faster than even war or the small-pox.

This difference no doubt proceeds from the difference in the means by which each pursues his end, and in the employment of their time: in other words,

* In 1799, the population of Upper Louisiana amounted to 6028.—Trans.

† At Detroit this national character is evident, for most of the French people told me, when I was there, that they were going into the British territory, rather than submit to the troublesome republican forms of the United States.

it resolves itself into a difference in what is called habit or national character. This originates in education and in government, either of which does more than the physical constitution or temperament. This will clearly appear on comparing the two nations in their ordinary life and conduct.

The settler, of British or German descent, is of a cold and phlegmatic temper, and deliberately forms a plan of husbandry, which he steadily pursues. He attends sedulously to every thing that can influence the success of his projects. He never becomes idle, till his end is accomplished, and he has put his affairs on a good footing.

The impetuosity of the Frenchman leads him to embrace precipitately any plausible or flattering project, and he proceeds in his career without laboriously computing expences and contingencies. With more genius for his portion, he laughs at the dullness and cautions of his Dutch or English neighbour, whom he stigmatises as an ox: but his neighbour will sedately and wisely reply, that the patient ox will plough much better than the mettlesome racer. And, in truth, the Frenchman's fire easily slackens: his patience is worn out; and after changing, correcting, and altering his plans, he finally abandons his project in despair.

His neighbour is in no haste to rise o' mornings, but when fairly up he applies steadily to work. At breakfast he gives cold and laconic orders to his wife, who obeys them without contradiction or demur.

Weather permitting, he goes to plough or chop; if the weather be bad, he prosecutes his in-door tasks, looks over the contents of his house and granary, repairs his doors or windows, drives pegs or nails, makes chairs or tables, and is always busy in making his habitation more comfortable and secure. With these habits, he is nowise averse to sell his farm for a good price, and move, even in old age, still farther into the forest, cheerfully recommencing all the labours of a new settlement. There will he spend years in felling trees, building a hut and a barn, and in fencing and sowing his fields. His wife, as placid and patient as himself, will second all his labours, and they will sometimes pass away six months without seeing the face of a stranger. In four or five years, comfort, convenience, and ease will grow up around them, and a competence will recompense their solitary toils.

The Frenchman, on the contrary, will be up betimes, for the pleasure of viewing and talking over matters with his wife, whose counsel he demands. Their constant agreement would be quite a miracle: the wife dissents, argues, wrangles, and the husband has his own way, or gives up to her, and is irritated or disheartened. Home, perhaps, grows irksome, so he takes his gun, goes a shooting or a journey, or to chat with a neighbour. If he stays at home, he either whiles away the hour in good-humoured talk, or he scolds and quarrels. Neighbours interchange visits: for to visit and talk are so necessary to a Frenchman,

that along the frontier of Canada and Louisiana there is no where a settler of that nation to be found, but within sight or reach of some other. On asking how far off the remotest settler was, I have been told, He is in the woods, with the bears, a league from any house, and with nobody to talk to.

This temper is the most characteristic difference between the two nations; and the more I reflect upon this subject the firmer is my persuasion, that the Americans and the northern Europeans, from whom they are descended, chiefly owe their success in arts and commerce to their habitual taciturnity. In silence they collect, arrange, and digest their thoughts, and have leisure to calculate the future; they acquire habits of clear thinking and accurate expression; and hence there is more decision in their conduct, both in public and domestic exigences, and they at once see the way to their point more clearly, and pursue it more directly.

On the contrary, the Frenchman's ideas evaporate in ceaseless chat; he exposes himself to bickering and contradiction; excites the garrulity of his wife and sisters; involves himself in quarrels with his neighbours; and finds, in the end, that his life has been squandered away without use or benefit.

These distinctions may be thought trivial; but they are connected with the employment of time, and time, as Franklin says, is the fleece from which is spun the thread of life. These habits must inevitably tend to make men superficial and thoughtless. I have often

questioned the Canadians of the frontier as to distances of time or place, or measures of capacity or magnitude, and have found their notions crude and obscure. They appear to feel and see without reflection, and are unequal to any calculation, in any degree complex. They would say, from this place to that is one or two pipes of tobacco; you can or cannot reach it by sunset, and the like. But an American settler will state exactly the distance in miles or hours, and the weight or magnitude in pounds, gallons, or yards, and is capable of entering into calculations and forming estimates. This practical skill is productive of important effects in human life, and my readers may be surprised to hear, what nevertheless is true, that, even in Europe, it is much less common among the French than we imagine.

I have often heard this gossipping and tattling disposition ascribed to warmth of blood, and briskness of flow in the animal spirits; but I should rather judge it to be the mere effect of artificial habits and opinions: for going into the east a talkative and lively Frenchman, I returned, in three years, as demure as a Turk. A short stay in France restored my old habits; but a few months abode in the United States gave me back my oriental taciturnity, which, in like manner, after my return to Paris, quickly yielded to the sprightly influence of my native air.

These habits owe much of their force to fashion. Among the Turks and Americans, to talk much is a mark of ill-breeding and vulgarity, while, with us,

silence is a token of pride or sullenness: to talk evinces wit and politeness, and to let the conversation drop or droop is a proof of wanting one or the other*.

The same prejudice it is, the offspring of fashion or education, which inclines the French to blame the readiness of the American to quit his natal spot and ancient patrimony, and fix himself in a new region. There is certainly no crime in leaving a place, when our condition, as we think, can be bettered by a change: but this view of things, if carefully considered, will be found to have been propagated by the rulers, and fostered by the laws of nations in political slavery. To chain men to the soil was always the labour of tyrannical governments, afraid lest their victim should escape them. Now the original motive of the Americans, in leaving Europe, was to break their civil and religious fetters, and we need not be surprised that emigration has become a habit with them, and possesses, in their eyes, the charms which attend an act of liberty. Be this as it may, this spirit will more advance the civilization of the globe than that of a sedentary people, who would rather spend

* This criterion of wit and politeness seems to prevail every where. To keep up a constant and lively conversation is as much desired on one side of the ocean as the other, but loquacity implies the impulse of impertinence and vanity, and is only charged upon those who, in company, talk more than their share.—Trans.

their lives in wars or idleness at home, than form useful and splendid settlements abroad.

I might, perhaps, not improperly, embrace this opportunity of tracing to their true causes the taciturnity of the one nation, and the reserve of the other. I might enquire if any connection subsists between a dark and misty sky, and a grave and serious demeanour; or whether a clear air and brilliant sun does not stimulate to gaiety, by augmenting the electric fluid, which fills and animates the nerves; and whether cold and wet do not make us splenetic, by a direct but inverse action on the nerves and viscera. But since the enquiry is extremely complex; since the natives of some southern regions, like the Hindoos, Turks, and Spaniards, are as demure and taciturn as some northern nations; since we must enquire why, even in England, the people of bustling cities are as talkative as Frenchmen; since we ourselves are said to have lost somewhat of our vivacity; since women, in all countries, are more garrulous than men, and slaves more than denizens; since it would be first necessary to settle the meaning of the word nation; to examine whether a peculiar character does not cleave to every class and profession; and to decide whether what we call the national character be any thing more than the habits of the highest or ruling class; I shall forbear to enter on such abstruse topics. I must, however, observe, that the principles rashly embraced by most political writers are at war

with experience; that climate and constitution, when most powerful, are causes but subordinate to laws and government, which are able to new-mould our habits, change our conduct, and introduce a total revolution in the character of nations.

An instance to this purpose may, I think, be found in the manners of the settlers at Gallipolis and Vincennes. Between these there is a difference, which clearly shows that the subjects of Louis XIV and Louis XV were far inferior to the present generation in knowledge and industry. The latter, since 1771, have received impressions, and acquired motives of activity, unknown to their ancestors. I have greatly regretted that the Scioto colony, whose members were sober and industrious, were not guided at first to the Wabash or the Mississippi. By adding their numbers and substance to those of the ancient settlers, a body might have been formed capable of defending itself both against *whites* and *reds*, the savage on one side, and the land jobber on the other, and might have formed a central point for other emigrants to collect around, other Frenchmen who wished to transmit to their posterity the inheritance of liberty and peace.

No. VI.

On the Indians or Savages of North America.*

MY stay at Vincennes afforded me some knowledge of the Indians, who were there assembled to barter away the produce of their red hunt. There were four or five hundred of them, men, women, and children, of various tribes, as the Weeaws, Payories, Sawkies, Pyankishaws, and Miamis, all living near the head of the Wabash. This was the first opportunity I had of observing, at my leisure, a people who

* The Americans, after the example of the English, call the *savages* Indians. The former term is preferable, because it is absurd to give the name, proper to the great Hindoo peninsula, first to South and then to North America. It was the mistake of an early Portuguese navigator, who, in his voyage to India, wandered so far to the west, as to light upon the coast of Brazil, which he consoled himself by naming the West Indies.—V. The French *sauvage* answers, first, to the English *savage*, which is applied to persons or actions which we want to stigmatize as wicked and cruel, and is given to men in the rudest state of society, only when we allude to their ignorance or ferocity ; and, secondly, to *Indian*, which, however derived, is become the *proper name* of the aboriginal tribes of America. To use the term *savage* as a national appellation would be bad English.—TRANS.

have already become rare east of the Allegheny. It was, to me, a new and most whimsical sight. Bodies almost naked, tanned by the sun and air, shining with grease and soot; head uncovered; hair coarse, black, and straight; a face smeared with red, blue, and black paint, in patches of all forms and sizes; one nostril bored to admit a ring of silver or copper; ear-rings, with three rows of drops, down to the shoulders, and passing through holes that would admit a finger; a little square apron before, and another behind, fastened by the same string; the legs and thighs sometimes bare, and sometimes covered with cloth hose; socks of smoke-dried leather; sometimes a shirt, with short loose sleeves, and flowing loosely on the thighs, of variegated or striped cloth; over this a blanket, or a square piece of cloth, drawn over over one shoulder, and fastened under the other, or under the chin. On solemn occasions, or for war, their hair is braided with flowers, feathers, or bones. The warriors have their wrists adorned with broad metal rings, like our dog collars, and a circle round their heads, of buckles or beads. They carry in their hand a pipe, knife or tomahawk, and a little looking-glass, which they examine with as much attention and complacency as any European coquet. The females are a little more covered about the loins. They carry one or two children behind them in a sort of bag, the ends of which are tied upon their forehead. In this respect they have a strong resemblance to our gypsies.

The men and women roamed all day about the town, merely to get rum, for which they eagerly exchanged their peltry, their toys, their clothes, and at length, when they had parted with their all, they offered their prayers and entreaties, never ceasing to drink till they had lost their senses. Hence arise ridiculous scenes. They will hold the cup with both hands, like monkies, burst into unmeaning laughter, and gargle their beloved cup, to enjoy the taste of it the longer; hand about the liquor with clamorous invitations, bawl aloud at each other, though close together, seize their wives, and pour the liquor down their throats, and, in short, display all the freaks of vulgar drunkenness. Sometimes tragical scenes ensue: they become mad or stupid, and falling in the dust or mud, lie a senseless log till next day. We found them in the streets by dozens in the morning, wallowing in the filth with the pigs. It was rare for a day to pass without a deadly quarrel, by which about ten men lose their lives yearly. A savage once stabbed his wife, in four places, with a knife, a few paces from me. A similar event took place a fortnight before, and five such the preceding year. For this, vengeance is either immediately taken, or deferred to a future opportunity by the relations of the slain, which affords fresh cause for bloodshed and treachery. I at first conceived the design of spending a few months among them, as I had done among the Bedwins; but I was satisfied with this sample, and

those the best acquainted with them assured me, that there was no Arabian hospitality among them: that all was anarchy and disorder. The greatest chief could not strike or punish the meanest warrior, even in the field, and at home nobody obeyed him but his own wife and children. They dwell separately, in mistrust, jealousy, and eternal animosity. With them, what they want they have a right to, and what they have strength enough to seize is their own. Besides, as they scarcely made provision for themselves, a stranger would run the risk of being starved.

I chiefly regretted, on abandoning my scheme, the loss of an opportunity for gaining some knowledge of their language, and forming a vocabulary: a scheme the importance of which, with respect to a people who want all other monuments, I have elsewhere insisted on*. The missionary R., whom I have already mentioned, having failed in all his efforts to this purpose, left me no hopes of succeeding. Some of the people of Vincennes are acquainted with the Indian dialects, but their pronunciation is so bad, and their ignorance of all grammatical distinctions so great, that they could afford him no aid. This more clearly appeared, when a chief of the Weeaws, an old and fast friend of the French, sought a conference with me: we could never get the Canadian interpreter to translate literally.

* See my Lectures upon History, lecture V.

The only person in America capable of giving me the aid I wanted was a man by the name of Wells, who had been made captive by the Indians at thirteen years of age, and, having previously had a good education, he acquired an accurate knowledge of many of their dialects, while he lived among them. After the victories of Wayne, in 1794, he obtained leave to return home, and was at this time acting as interpreter to the general, who was negociating at Detroit with more than seven hundred Indians.

This agreed with my plan of visiting Niagara.—I accordingly returned to Louisville, and passed through Frankfort, the capital of Kentucky, and Lexington, where, in 1782, not a house was to be seen, but which now contained near five hundred habitations, well built of brick. Thence I went to Cincinnati, and availed myself of a military convoy going to Detroit, through the kindness of major Swan, by a road formed by the army over two hundred and fifty miles of forest. Five pallisaded forts, neatly constructed, were the only stages in this journey. There I met with a most flattering reception from the commander in chief. The country and the season deprived me of the benefits I hoped from this reception, for I was disabled by a severe fever.

I was obliged to seize the only opportunity that offered for crossing the lake before winter, and return to Philadelphia, where fortunately Mr. Wells arrived, in company with a noted Miami chief, called Mishikinakwa, or the Little Turtle. It was he who con-

tributed most to the defeat of St. Clair, and well-informed officers have assured me, that had his plan of waylaying stragglers, and cutting off convoys, been followed, Wayne's army would probably have shared the same fate. This hero, convinced at length that all opposition was fruitless, had the wisdom to persuade his tribe to peaceable measures. His good sense perceived the necessity of turning the attention of his people from hunting and fishing to tillage, and he came to Philadelphia with a view of obtaining the assistance of the government, and the benevolent society of friends*, to his laudable intentions. He had been inoculated for the small-pox since his arri-

* Commonly called quakers: a sect which has, perhaps, been too much applauded in Europe, and too little in America, on account of the blacks, but which, impartially considered, is, in its theoretical and practical morality, more favourable than any other to the happiness of mankind. Every plan of public charity or reformation in Pennsylvania is its work, and nothing seems wanting to make it the *church* of all reasonable people, but the introduction of the physical sciences into their seminaries of education. How can the truly devout condemn as profane the study of the works of God?—V. The quakers pay due respect to the physical and mathematical sciences, and consequently the *requisite* here mentioned is *not* wanting. They even admit the study of ancient and modern languages and literature into their schools; and, with regard to the various branches of liberal pursuit, they object to nothing but what is chiefly or solely conducive to the amusement of the senses, as music, dancing, and the like. They deem the human character truly adorned and ennobled by skill in natural philosophy and history, and the sciences properly so called.—TRANS.

val. He had both gout and rheumatism, for which the government had eagerly provided him medical aid.

By this accident I was furnished not only with a skilful interpreter, but with the mouth of a native to afford the true primitive words: for I soon made myself acquainted with Mr. Wells and the *chief*. They readily concurred with my wishes, and nine or ten visits, in January and February, 1798, enabled me to draw up the vocabulary annexed. This was my principal purpose, but the course of conversation afforded me many hints and facts, the more to be relied upon, because they were given accidentally, and without design; and my being a Frenchman, added to the familiarity of so many interviews, lessened that suspicion and distrust which these people are apt to entertain of strangers. After each visit I put upon paper what appeared to me worth noting, and these hints, together with such as I was able to collect from other respectable quarters, form the substance of the following pages.

I am neither able nor willing to treat of savage nations in general. There is such a difference, in character and manners, between the savages of hot climates and of cold, open and wood land, sterile and fruitful, wet or dry, that the theme would be too extensive. I shall merely speak of the aborigines of North America, and desire only to contribute my testimony towards clearing up a subject so much obscured by paradox and misrepresentation. The reader, I pre-

sume, is not wholly unacquainted with those travellers who have visited and described this people within the last forty years*.

I first conversed with them on the climate and soil of the Miamis. Mr. Wells informed me, that this tribe dwelt on the upper branches of the Wabash: that its language is spoken by all the tribes of that river, nearly to Lake Michigan, as the Weeaws, Payories, Pyankishaws, Kaskaskias, and Long Isle

* As Carver, whose travels, in 1768, have been well translated. This writer, though a little credulous and vain, and biassed, by their respect for him, in favour of the savages, seems, on the whole, to have been upright and sincere. His confession that he was unqualified for forming an Indian grammar and dictionary, leads me to suspect that his work was compiled by another, as was the case with a well-known French traveller.

Another traveller is John Long, twenty years a factor in the Canada fur trade. His book appeared in 1791, and was translated into French in 1793. It is to be lamented that the translator has omitted the vocabulary. The entire work deserves republication, for I know of no picture so good of the Indians and traders.

A third is Bernard Romans, of whom I have already said enough.

A fourth is Umphraville, whom I have made known to my countrymen.

Adair's book on the Creeks and Cherokees deserves not mention, because he has mixed with a few facts a great many misrepresentations and absurdities, to prove the Indians descended from the Jews. This groundless notion, which, however, is cherished by a great many missionaries, has led him to view every thing in a delusive light. Without sound notions of the nature of the human understanding, its progress, and the causes that model the man of nature, we are not fit to investigate the history of nations.

Indians: that its dialect is nearly allied to that of the Chippeways, Ottawas, and Shawanese, but quite distinct from that of the Delawares. The Miamis make much use of the nasal sounds, and I almost imagined I heard the Turkish. Their country is divided between forest and savannah, and is colder than Vincennes. After leaving a complete thaw in this country, Mr. Wells found the same snow 130 miles north, without any mountainous elevation of the surface. The air at Philadelphia was not so keen. Their winds resemble those on the sea coast. In winter they have clear weather, with a strong and cutting north-west; in summer the south-west prevails, hot, wet, and sometimes tempestuous. The chief rains are brought by the south; the north, in winter, brings snow, but, in summer, is fair and mild. The south-east is rare, and the north rarer. They have a good soil, with finer maize, and greater plenty of game, than are found east of the mountains. Hence it is that the natives are a stout, well-formed race. The same may be said of the Shawanese, the stature of whose women astonished me more than their beauty.

While talking with Wells, I was not inattentive to the chief. Not understanding English, he took no part in the conversation, but walked about, plucking out the hairs from his chin, and even from his eyebrows. He dressed in the American style; in a blue suit, with round hat and pantaloons. I desired Mr. Wells to ask him how he liked his clothes. "At

first," said he, "they confined my limbs unpleasantly; but I have got used to them; and as they defend me against *the heat* and the cold, I now like them well enough." Tucking up his sleeves, he showed me a skin, between the wrist and elbow, whose whiteness surprised me. It differed not at all from my own. My hands were as much tanned as his, and we looked as we had a pair of gloves on. His skin was as soft and fair as a Parisian's.

We talked a good deal about the colour of the Indians. The copper or red hue is commonly supposed to be innate, and to discriminate this race, as black does the Africans; but I gathered from these interviews, that, though they distinguish themselves by the name of red men, and justly pride themselves on this distinction, yet they are born as white as we*, and continue so through infancy†, the copper hue being derived from exposure to the sun, and from the grease and juices with which they rub themselves. The women are always white about the middle, in those parts which are constantly covered. It is, therefore, far from true that the copper hue is innate to this people; nor indeed is it universal: on the contrary, many tribes of North America have different shades, and their diversity, in this respect, is one of their means of distinguishing each other.

* So is the negro, but he grows black in a few hours.

† Oldmixon says the same.

Mr. Wells, who had lived, in their fashion, fifteen years among them, had their complexion. The real colour appeared to be that of soot, or of smoked ham, clear and shining, exactly similar to that of the peasants of Lower Poitou, who live like savages, in a hot, moist climate, or that of the Andalusians.

On mentioning this to Little Turtle, he replied: "That he had seen Spaniards in Louisiana, and saw no difference between their colour and his own. And why," said he, "should there be any? In them and us the sun, *the father of colours*, causes it by burning us. You yourselves see the difference between your faces and bodies." This reminded me that, when I quitted the turban, on leaving Turkey, half my forehead resembled bronze, while the other half, above it, was as white as paper. If, as philosophers believe, all colours flow from light, it is plain that the difference in human complexions is produced by the action of this fluid, in conjunction with some other, on the skin. It will one day be proved, that the sable hue of the negro arises from no other cause*.

The features of the *Little Turtle* bore a strong resemblance to those of some Chinese Tartars, who had been brought to Philadelphia by Van Braam, the

* New facts, corroborating this conclusion, daily occur. One of these is the remarkable case of Henry Moss, a negro of Virginia, descended in the third degree from natives of Congo, who, in the course of seven years, became white, with smooth brown hair, like any European. He is the same mentioned by Liancourt.

Dutch ambassador to Pekin. This likeness between the Indians and Tartars has struck all who have seen them both, but perhaps some have too hastily inferred that the former are originally from Asia. As Indians have some notions of geography, I explained this theory to the chief, and laid before him a map of the contiguous parts of Asia and America. He readily recognized the Canadian lakes, and the Ohio, Wabash, &c., and the rest he eyed with an eagerness that showed it was new to him: but it is a rule in Indian manners never to betray surprise. When I showed him the communication by Behring's Straits and the Aleutian isles, "Why," said he, "should not these Tartars, who are like us, have gone first from the American side? Are there any proofs to the contrary? Why should not their fathers and our's have been born in our country?" The Indians, indeed, give themselves the name of Metoktheniaka *(born of the soil.)* "I see no objection," said I: "but our *black coats* (the name given by the Indians to the missionaries) won't allow it. It is only difficult to find out how any particular nation sprung up at the beginning." "But that," he answered, "is as great a difficulty to the *black coats* as to us*."

I have said that the Indians resemble the Asiatic Tartars; but some exceptions must be made, for the

* Volney never slips an opportunity of glancing at religion. If he really knew of no argument, no proof, in favour of the prior settlement of the eastern continent, he must indeed be as ignorant as his savage acquaintance.—TRANS.

Esquimeaux of the north, and the grey-eyed race, near Nootka Sound, are each a distinct race, with no Tartarean features. The Tartar face belongs only to those who people the middle and southern regions, and who form a vast majority. This face is not that of the Calmucks, whose flattened face and nose are not found among them. In general, the Indian face is triangular at the lower part, and square at the upper; has a well-shaped forehead; eyes black, deep set, small and lively; cheeks somewhat prominent; a straight nose, and thick lips; their hair is universally black, coarse, and straight; their look is watchful, suspicious, and ferocious.

Such is the national physiognomy, but it is varied in the tribe and individual. At Vincennes and Detroit I met with faces that reminded me of Bedwins and Egyptian fellahs. In the hue of their skin, quality of hair, and many other circumstances, they were alike. They likewise resemble in having a mouth shaped like a shark's, the sides lower than the front, the teeth small, regular, white, and very sharp, like the tyger's*. This form may perhaps arise from their custom of biting from a large piece when they eat, without the use of knives. This motion gives the muscles a form, which they at length retain, and the solid parts are modified conformably to it†.

* Children consequently cut them easily, and never suffer from dentition.

† This will not account for the sharp teeth and the easy dentition, nor, indeed, will it account for any thing.—TRANS.

Viewing things in this light, the resemblance between savage tribes, remote from each other, will not argue any relationship between them, for similarities in shape and feature will naturally flow from similar climate, soil, food, and manners. Their women have no peculiarity of feature. I do not deny the claim of the females to beauty. In this respect tastes cannot but vary, and toil and abstinence will make that a dainty, which, at another time, would be nauseous or insipid. I shall say little of the custom of the Chactaws to mould the skull of their new-born children to the shape of a truncated pyramid, by pressing them between boards. This mode is so effectual, that the tribe is known by the name of the *Flat Heads*.

Some intelligent writers have said, that these people are all so much alike, that they are hardly distinguishable one from another. They might as well say that all negroes and all sheep are alike: but this would only prove the carelessness of their scrutiny; that they have not the eye of the shepherd or the slave dealer. "We know every tribe," said Little Turtle, "at first sight. The shape, colour, knees, legs, and feet are all to us certain marks of distinction. The print of the foot enables us to distinguish not only between men, women, and children, but even tribes. You whites are always known by turning out your toes. We carry them straight forward, to avoid the obstacles of stones and bushes. Some turn their toes inward, have broad or narrow, long

or short feet; some tread more on the heel, others on the toe, and the like."

That the Indians have no beard is a notion groundless, indeed, but formerly very current. The smooth chin is occasioned by the extreme care with which the hairs are, from time to time, eradicated. This custom is attested by all the accurate observers, such as Romans, Carver, Long, Umphraville, &c. Oldmixon, who wrote, in 1707, from the best authorities, says, the Indians have no beard, because they use certain receipts to remove it, which they will not disclose. These receipts are since found to be nothing more than little shells, employed as tweezers. Since metals have been known to them, they make use of a piece of brass wire rolled on a round stick, of the size of a finger, so as to form a spiral spring, which grasps the hair, and pulls out several at one time.

It is strange that our Lahontan, and Kaimes among the English*, should have been ignorant of this fact: but it is by no means wonderful that such a paradoxical visionary as De Pauw should adopt the notion that the Indians are naturally beardless. Both Mr. Wells and Little Turtle left me no doubt on this head. The latter was as constantly employed in extracting the hair, even of his eye-brows, as the Turks are in curling their whiskers. No wonder if this

* And the illustrious and laborious investigator Dr. Robertson.—TRANS.

practice, continued for *several generations**, enfeeble the roots of the beard. As to hair elsewhere on the body, I myself have seen it surprisingly long and straight under the arm-pits. Does it grow more freely from exposure to the air? and did the custom of out-rooting the beard arise from the wish to deprive the enemy of such a hold on the face? This to me seems probable.

The shape of the Indians is justly admired. They are generally plump and well made. Those who dwell in a fruitful and well watered country, like the banks of the Wabash, are taller and stouter than those who occupy poor land, which is the situation of all beyond latitude 45° north, who are both shorter and more slender. If we never meet with halt or blind among them, we must not draw too hasty an inference in favour of Indian manners, since every feeble child must necessarily perish in infancy. Nay, parents will sometimes expose a deformed and burthensome infant; and, in this respect, they imitate the Spartans, and obey Lycurgus: not that they took the hint from the Spartan legislator, but because the same causes produce every where the same effects. In a poor and warlike nation, there is no place for idle or helpless mouths: and hence it is, that among many tribes, north of Lake Superior, the old and burthensome are dispatched to live in another country; in

* How should the practice of one man, in this respect, affect the growth of hair in his grandson?—TRANS.

plain terms, they are killed, as was done, according to Herodotus, by the savages of Scythia and the Erythrean sea. So wretched is this state of barbarism, that the old men themselves are generally the first to ask for death. If an Indian lose a limb by war or disease, he is undone. How could a cripple resist a robust enemy? How could he hunt, or fish, or get food, which nobody will gratuitously give him? Nobody has any thing in store, and each one subsists on his own precarious and laborious gettings. Hence likewise it is that none of them labour under ruptures nor chronical complaints. Wild Nature around them seems to say, "Be strong or perish." Yet she often deprives them even of this hard option, by frequently multiplying their difficulties, till the strongest sink under the load.

Much has also been said of the sound health of the Indians. Doubtless their constitutions derive a force and vigour from hardship and exposure, which the effeminate life of cities cannot afford: but it is to be remembered, that their way of life is a tissue of irregularities and excesses incompatible with constant health. They abhor the quiet labours of the farmer; the roaming and precarious life of fishers and hunters they prefer; and having no stores nor durable provision, no cattle nor corn, they are liable to the most violent vicissitudes of scarcity and superfluity. When game is plenty, and they can pursue it without danger or constraint, they revel and gluttonize, but when it is scarce, and this happens every winter, or their

steps are hampered by the fear of an enemy, they are reduced to subsist, like the wolf, on roots and the bark of trees. They have lately bethought themselves of drying fish, and reducing it to powder, but they never provide enough to last them through the season. When, after a long fast, they light on prey, a deer, bear, or buffaloe, they fall on it like vultures, and leave it not till they are gorged to the throat. This custom makes them unmanageable guides on a regular journey. The quantity they will devour on such occasions, though the fact is supported by the strongest testimony, is scarcely credible. It is notorious that a couple of starving Indians will pick the bones of a deer clean at one meal, and be still unsatisfied. This reminds us of the heroes at Troy, who could eat up half a calf or a lamb at breakfast: a clear proof that these heroes were no better than Creeks and Cherokees.

Such excesses, preceded and followed by painful abstinences, must necessarily impair the stomach and destroy the health; and true it is that they are afflicted with diseases of the stomach, intermittent and bilious fevers, consumption, and pleurisy. Fractures and dislocations are not rare among them, but they are pretty dexterous in reducing them. They would suffer more from rheumatism, if they did not practice fumigation, by means of hot stones. The havoc made among them by the small-pox is well known; and the evil is no doubt aggravated by the hardness

of their skin, which opposes the eruption. Mr. Jefferson will do them an important kindness by teaching them, as the newspapers tell us he is doing, the process of vaccination. Of late years, the quaker and moravian missionaries, who have succeeded the jesuits*, tell us, that their converts have become more strong and hardy, and less subject to sickness, than the untamed savages. The superiority of the people of Kentucky and Virginia over them has been proved, not only in the contest of troop with troop, but man to man, in all their wars.

I shall not mention, in proof of their infirmity, their slow pulse, as maintained by Dr. Rush, because Dr. Barton, at the same time and in the same persons, could perceive no difference, and the pulse of Little Turtle appeared to me just like my own. Neither shall I mention the weakness of the sexual passion ascribed to them, as this arises from another cause. The Indian is continent and almost chaste from principle, and the danger of his situation ; the least diminution of his strength might cost him his life, by making him less able to resist the attacks of his fellow-men, or of Nature†.

* The quakers are missionaries on a new plan, since their object is not to influence the religious faith of the Indians, but merely to convert them into husbandmen, carpenters, smiths, and weavers.—TRANS.

† This is ascribing to the Indian much more moderation and foresight than he displays on other occasions. Since he is not

I asked Mr. Wells whether there were many whites who adopted the savage life from choice, and why they preferred it to what we call the civilised life. His answer, which was copious and minute, agreed with what I had already heard from men of sense and experience, in Kentucky, at Vincennes, and Detroit. I learned from all these persons, that the Canadians, or men of French descent, were much more apt to make this exchange, than the men of British or German blood. The latter bear a violent antipathy to the Indians, which is encreased by the cruelty these people exercise upon their captives. They have a particular repugnance to the Indian females, which the French have not. Yet the preference of a savage life is less common among grown men than among the young. Americans, who have been carried off at an early age, have sometimes become attached to this life, because the liberty in which children are indulged of running and playing about is more agreeble to them than the restraints of schools. To have nothing to do but to play is all that children desire; years will hardly inure them to labour and study, but a few days will give them habits of idleness and inde-

deterred, by the most palpable and powerful considerations, from the excessive indulgence of other appetites, more immediately and glaringly destructive of his safety and health than this, we cannot suppose him so very wise and provident on this head. The fact, indeed, ought to be proved before it is accounted for.—TRANS.

pendence. These are the primitive inclinations of man, and he turns to them mechanically*.

As to adults, especially if they be Americans, taken and adopted by the Indians, they seldom contract a liking for the wigwam. "I myself (said Mr. Wells, who appeared to be about thirty-two), though taken away at thirteen, and adopted and well treated, could never forget the scenes and pleasures I had already tasted.

" Those who join the Indians of their own accord are generally Canadians, shallow libertines, idle and capricious. The influence they acquire among their new friends flatters their vanity, and their licentious indulgences with the squaws form another charm to their vicious minds†; but when they grow old, and sink into extreme misery, they seldom fail to return to their early habits, and regret their rambles when too late.

" Among us, a man, with ever so little industry, may get a comfortable living for the present, and lay

* The children of the frontier settlers are but little acquainted with scholastic restraints. The true reason why the captive child soon becomes savage in his habits is the same that makes the savage himself persist in the course he has been accustomed to; because he was too young at the time of his captivity to have imbibed opposite habits and impressions, and young enough, therefore, to receive all those proper to the Indian mode of life. —TRANS.

† What becomes of the continence and chastity supposed above to be characteristic of the savage life?—TRANS.

up something for old age. We establish a farm, bring up children, who, when we are worn out with age, will close our eyes. Not so among Indians. All your pleasures consist of eating and drinking, and these are not always to be had, and hunting. The utmost flight of ambition is to be a great warrior, of some repute among five or six hundred men. Old age comes on with speed, your strength fails, your influence is no more, infirmity, contempt, neglect ensue, and the only boon you can beg for, with success, is the stroke that puts an end to your existence. The Indian never requires the service of another: to serve or obey is, in his eyes, an ignominy reserved only for women. To hunt and fight are his provinces, while on the women is laid the burthen of all household affairs, of tillage, if any there be, and of carrying the children and utensils on a journey: in short, they are beasts of burthen. They have no share in their husbands' property. Were Little Turtle to return home and die to-morrow, all his presents, clothes, hats, trinkets, would be scrambled for by his countrymen, and nothing go to his wife or children. Such is the custom of his tribe, and of many others: while living, each enjoys his arms, trinkets, and other moveables, but when dead, not even his knife or pipe falls to his children. They have no notion whatever of property in land *or houses**.

* Except the hut each one occupies.—TRANS.

"A life, thus hard, is constantly in danger. The chances to which his life is continually exposed, are the chief subject of an Indian's thoughts. It is a frail vessel, momently liable to be broken by a thousand accidents. Death becomes so familiar to him, that he regards it with indifference: when inevitable, he resigns himself to it, or braves it with alacrity. Hence it is that he is attached to nothing but his weapons, or perhaps some associate, whose aid is useful to his safety. He regards his children as any other animal regards its young. He fondles and caresses them while present, but he leaves them without reluctance, and goes to hunt or to fight without thinking of them more. They may shift for themselves, and live or die; no matter, since death must, sooner or later, be their lot. Suicide is common among them: they kill themselves when tired of life, or thwarted in love, or in rage, when provoked without the means of vengeance. They live almost wholly to the present, they give little or no remembrance to the past, and hope nothing for the future. In health, they gambol, laugh, and sing; sick or weary, they lie down, smoke, or sleep: but as they seldom possess the means or opportunity of food or repose, they can found on this no claims to liberty or happiness."

Such was the sum of Mr. Wells's information, which was the more valuable, as being the result of twelve or fifteen years experience. I was curious to

know the reasons that withheld the Indians from settling and incorporating with the whites, and why many of them, though educated in colleges and on farms, so eagerly reverted to the habits of their countrymen. A few days afterwards, I had an opportunity of making these enquiries of Little Turtle himself, and obtaining his answers.

Some of *the friends* had paid him a visit, and invited him to remain among them, promising him that he should want for nothing. When they were gone, I asked him, through our interpreter, why he did not accept their offer. "You know these people. They are slow in their offers and advances, but what they promise you know they will perform. Are you not more comfortable here than on the banks of the Wabash?"

He made a considerable pause, agreeably to the Indian habits of deliberation and reserve in speaking. After some meditation, walking about the while, and plucking out his beard, he replied: "Yes; I am pretty well accustomed to what I find here. I think this dress warm and comfortable. These houses are good to keep out wind and rain, and they have every thing convenient. This market (we overlooked Market-street) gives us every thing we want, without the trouble of hunting in the woods. All things considered, you are better off than we, but—here, I am deaf and dumb. I do not talk your language. When I walk the streets, I see every body busy about something; one makes shoes, another hats, a third sells

cloth, and all live by their work. I say to myself, which of these things can I do? Not one. I can make a bow, catch fish, kill deer, and go to war, but none of these things are done here. To learn what you do would ask much time, be very difficult, and uncertain of success; and meanwhile old age hurries on. Were I to stay with the whites, I should be an idle piece of furniture, useless to myself, to you, and to my nation. What must be done with useless lumber? I must go back*."

In this reply may we find the solution of the problem. To every removal to a strange country the language is the first obstacle. To live with those with whom we cannot converse is intolerable; and long after you speak it, it is extremely difficult to utter your wishes and ideas with readiness and propriety. This impediment surmounted, and the young only can hope to surmount it, three others remain:

* These reasonings would have been easily confuted, but no reasonings could have changed his inclinations, already moulded and fixed irrecoverably by the force of habit. The Indian life is a thousand times preferable, as to ease, safety, and liberty, to that of a sailor, yet how many of civilised communities are sailors! and how impossible to change their inclinations by reasoning! Habit endears motion, hardship, and danger, and an Indian returns to his woods for the same reasons which influenced an old gentleman of easy fortune, in Rhode Island, after several years retirement, to equip a ship, and resume his early vocation of *transporting negroes from Africa to Jamaica*. Every body knows the terrors, dangers, discomforts, and privations that beset the master, and, above all, the mariner of a slave-ship.—TRANS.

First, the early habits and impressions of childhood, the force of which is such, that, *after much consideration*, I am now *clearly of opinion*, that the moral system of man has assumed, at the age of five years, a shape and tendency which it will retain through life. New or late events may unfold it, but the character contains nothing new; all proceeds from the seed sown in childhood. Secondly, the tie of friendship and kindred. Thirdly, that painful and laborious preparation, which our social state would demand from an Indian; not to mention the physical difficulty of abjuring his careless and erratic habits, and submitting to the restraint and drudgery of cities*.

These men are in the state of wild animals, which cannot be tamed after they have reached a mature age. The missionaries have been long ago convin-

* All these causes apply with as much force to that part of civilised mankind who pass a country life, as to the Indians. The true problem is not why the Indian cannot be changed into a shopkeeper or mechanic, but why he cannot, like the Canadian of Vincennes and Kaskaskias, add to the enjoyment of his native woods, to hunting and fishing, the keeping of a cow or a few sheep, and the occasional culture of a corn field or a potatoe patch. This is all that the welfare of the United States, and their own happiness and dignity require of them. Nobody would think of persuading Little Turtle or Corn-Planter to idle away his life in the streets of a city, which any Canadian trader or Ohio planter would find as irksome and unnatural as he; but why he cannot, if in fact he cannot, be persuaded to use his influence and example to induce his tribe to provide against scarcity of game, or infirmity of age, by appropriating and cultivating a little ground, is the only mystery.—TRANS.

ced of this, and they all agree that this people can only be changed by taking them from infancy, nay, even from the birth, as we take birds we wish to discipline, from the nest. This passion for independence, that is, for doing nothing, is so strong among mankind, that the mechanics who adventure from Europe to America, if they have not skill to thrive pretty soon in the towns, generally apply their little earnings to buying a few acres in the country, where ground is to be had for twenty or fifty cents an acre, and there they settle as proprietors. Cutting down trees being rather toilsome, they soon relinquish the task, and mingle with their labour the diversions of shooting and fishing. In short, they become half savages. But what price do they pay for these pleasures? Let us hear Mr. Wells.

"Little Turtle has good reasons for what he says. If he delayed returning, he would lose all credit with his countrymen. Already it requires some address to retain their esteem. At home, he must resume their dress and habits, and be careful of praising those he has left, for fear of wounding their pride, which is extreme. Among them, the jealousy of every member of the clan makes the station of chief as perilous and tottering as that of a leader in a democratic state, for theirs, in fact, is a wild and lawless democracy. This man has at home good clothes, *tea*, and *coffee*. He has a cow, and his wife makes butter. But he must not indulge himself in these things, but reserve them for the whites. His first cow was killed by

night, and he was obliged to feign ignorance of the man who did it, and to report that she died of herself*."

"What," said I, *with an air of surprise*, "are these men of nature capable of hatred, envy, and sordid revenge? There are prime geniuses among us who maintain that the passions take root only in civilised society."

"Well," said Mr. Wells, "let them spend a few months among Indians, and they will change their opinion." He then confirmed all I had heard at Vincennes and in Kentucky, of the intestine feuds and anarchy that raged among these nations. He told me, that the old had no coercive power over the young; that any mutinous or fanatical young man might raise confusion among the youth, always turbulent, because idle, and stir up a war involving the whole tribe. Those things did not merely follow from the madness of drunkenness, but from certain superstitions, and a thirst of blood and of motion, common to wild men and wild beasts. He gave some curious instances of tricks and stratagems among neighbouring tribes, the feuds they gave birth to, the deep revenge harboured for slight affronts,

* It appears, then, that Little Turtle was a man capable of seeing the benefits of turning farmer. His difficulties were unavoidable in his situation, but he is an example that an Indian can abjure his habits, and adopt all the modes of the whites which are worthy of adoption.—Trans.

and the system of immeasureable retaliation which these produce.

A striking example of this vindictive spirit occurred, within my own observation, at Miami fort, in the conduct of a noted chief called Blue Jockey. This man, when drunk, met an old enemy, to whom he had borne a grudge of twenty-two years standing. Blue Jockey seized the opportunity, and killed him. Next day all the family were in arms to revenge the murder. He came to the fort, and said to the commanding officer, who repeated the tale to me, "Let them kill me. It is but right. My heart betrayed me, and the liquor robbed me of my wits. But they threaten to kill my son, and that is not just. Father, try to make it up for me. I will give them all I have: my two horses, my trinkets, my weapons, except one set, and, if that will not content them, I will meet them at any time and place, and they may kill me."

This law of retaliation prevails among all barbarians, that is among those who have no regular government: for then each man is obliged to be his own protector. To suppose it transmitted from the earliest races, from Arabs or Hebrews, is absurd. It may indeed have been the Arabs who introduced it into Spain, Italy, and Corsica*. It is quite pos-

* In the three months which I spent in Corsica, I heard of 111 private murders, committed in retaliation. Under the Genoese government, they amounted to 900 yearly. What a government! what manners!

sible, however, that barbarism had introduced it already, and without their aid*.

" Yet," said Mr. Wells, " the Indians of the Wabash, the Miamis, Putewoatamies, &c. are better than they were a few generations ago. Longer intervals of peace, which they owe to the decline of the Six Nations, have allowed them to raise some corn and potatoes, and even cabbages and turnips. Their captives have planted peach and apple trees, and taught them to breed poultry, pigs, and even cows: in short, they are as much improved as the Creeks and Chactaws†.

When we recollect that, according to the earliest travellers and annalists of New England and Virginia, the Indians were of old still further advanced than at present; that each tribe had a sachem or chief, possessed, in some respects, of monarchical authority, and

* The last two sentences contradict, in some degree, the foregoing one. Retaliation is the mode of punishment which all simple nations, and some refined ones, have solemnly adopted, as the most just. The same structure of mind, which gave this rule to one nation, or one man, gives it to another.—TRANS.

† These hints would lead us to suppose that the Indian tribes have really derived some benefit from their vicinity to a civilised people. They very early learned the use of horses and fire-arms, and thus acquired new means of killing game and defending themselves. They receive many useful, as well as some pernicious things, in the way of trade, and have already probably taken several steps towards a total assimilation to the customs of the whites, but they are hastening to extinction with a much quicker pace than to civilisation.—TRANS.

composing privileged and noble families, as among the Arabs; that their population was considerable, and their respective territories of moderate extent: must we not infer that their state was more civilised; that they would have spontaneously gone forward to the point which human societies have reached in the eastern continent; that their wars with the colonists have plunged them into anarchy, and thrown them many degrees backward; that their state, rude as it is, is liable to revolutions, perhaps the more frequent and violent, as their numbers are smaller, and their condition weaker?

The Weeaw chief, who harangued me at Vincennes said to me, "Before the war (from 1788 to 1794), we were united and peaceable; we began to raise corn like the whites. But now we are poor hunted deer, scattered abroad without house or home, and, unless somebody come to our assistance, no trace of us will be left."

While conversing with Mr. Wells, the chief was looking out of the window at what was passing in Market-street. To draw his attention, I told him I had been among a people strangely different from his, for they were kept in subjection by five or six thousand horsemen, though they amounted to two millions and a half in number, and covered a country almost equal to the Ohio. So that about three hundred and seventy persons allowed themselves to be robbed, imprisoned, beaten, and abused by a single man, no stronger than any of them.

Knowing the haughty spirit of an Indian, I expected some very indignant reply; but he merely answered, quietly stroking his chin, "For all that, they have, no doubt, pleasures of their own kind." I was much surprised at an answer which betokened a mind free from the prejudice of education, and capable of comprehending the power of habit.

In conclusion, I enquired what it was that so much engaged his attention in the market, and what he thought most remarkable in Philadelphia.

"In observing this multitude" (it was market day), replied he, "two things surprise me: the great number of the white people, and the difference in their faces. We red men have each a face and appearance of his own, but still we are all much alike: but here there is an endless and puzzling variety. There are ten different shades between black and white; and the face, the forehead, nose, mouth, and chin; black, brown, and light hair; blue, grey, and brown eyes: all make such a diversity as puzzles me very much."

I told him that this city was visited by all nations of the globe, and these, by marrying together, could not fail of producing great varieties. But, added I, if you were to visit the inland parts of our countries, France or England, you would find all the people of a village, by marrying among themselves for many generations, become all alike.—This is what I have frequently noticed, in sequestered and lonely parishes, especially in the forests of Laval and Rennes. Sta-

tioning myself at the church door, I have examined the people as they passed, and I have observed one general physiognomy common, but peculiar to each parish.

"As to your numbers," said the chief, "your encrease is quite inconceivable. More than two lives, supposing eighty years to each, have not gone by since the whites first set foot among us, yet already they swarm like flies: while we, who have been here nobody knows how long, are still as thin as deer."

Finding his thoughts going in this track, I asked him why they did not multiply as fast. "Ah!" said he, "our case is very different. You whites contrive to collect upon a small space a sure and plentiful supply of food. A white man gathers from a field, a few times bigger than this room, bread enough for a whole year. If he adds to this a small field of grass, he maintains beasts, which give him all the meat and clothes he wants, and all the rest of his time he may do what he pleases; while *we* must have a great deal of ground to live upon. A deer will serve us but a couple of days, and a single deer must have a great deal of ground to put him in good condition. If we kill two or three hundred a year, 'tis the same as to eat all the wood and grass of the land they live on, and that is a great deal*. No wonder the whites

* A thousand acres a head, in a fruitful country, is a scanty allowance for Indian population. An Irish peasant's family, of six persons, derive a plentiful subsistence from three acres of pasture

drive us every year further and further before them, from the sea to the Mississippi. They spread like oil on a blanket; we melt like snow before the sun. If things do not greatly change, the red men will disappear very shortly." These remarks convinced me, as they will my readers, that this man has justly earned the reputation which he enjoys, for sagacity superior to most of his countrymen.

Here we have an Indian, who, in spite of the prejudices of his education, of prejudices sanctioned by the ancient and universal habits and opinions of his countrymen, has had penetration enough to discover the essential basis of the social state in the cultivation of the earth, and in landed property: for there can be no regular cultivation without a stable right of property. In all these tribes there is a set of old men, who, when they see any one busy with the hoe, exclaim against the degeneracy of modern times. They pretend that their national decline is owing entirely to these innovations, and to retrieve their ancient glory and prosperity nothing more is needful than to throw away the hoe, and return to their primitive manners*.

and potatoe land. Here is, then, the enormous difference of a thousand to one.—TRANS.

* Their condition would doubtless be improved, if they abjured *every thing* new and European. They would profit, on the whole, if they got rid of spirits and the small-pox, together with every beneficial acquisition.—TRANS.

Let any one compare this sketch with the speculations of Rousseau, who maintains that the introduction of exclusive property was the first corrupter of manners, and who deplores that folly and infatuation which prevented the savage from pulling up the first stake, as a sacrilegious restraint upon his natural liberty*. Let him consider to which the most credit is due; a man situated like Little Turtle, who has spent fifty years in the management of public affairs, in governing turbulent and jealous minds, with acknowledged skill and address, and has fully experienced the benefits and evils of both ways of life; or a humble individual like Rousseau, who never had the care of any public business, and knew not even how to manage his own; who, having created for himself an airy and fantastic world, knew as little of the society of which he was born a sequestered member, as of Indians, of whom all his notions were gathered from the woods of Montmorenci; who even did not vindicate the tenets of his book from conviction, but as a wanton exercise of eloquence and ingenuity, and who was zealous in defence of them, merely because his humour was thwarted, and his vanity mortified†.

* See Rousseau, *Sur l' Inegalité*, &c.

† This hint respecting Rousseau is founded upon some little circumstances, which are often of much importance in the history of great men. My information was received from the late baron Holbach and Mr. Maigeon, member of the Institute. When the Academy of Dijon proposed its celebrated question, Diderot was a prisoner in the castle of Vincennes, for his letter *On the Blind*.

What a pity is it that this author embraced a bad cause, as his talents would have been proportionably more useful and successful in the cause of truth, and he might have had ample scope in declaiming against the genuine corruptions of society. If he had drawn a true picture of savage life, as a state without compact or union, by which roaming and unsettled men

Rousseau used to visit him. On one of these visits, he showed Diderot the question, and said, " 'Tis a curious subject: I have a mind to enter the lists." " In what way," said Diderot, " do you mean to take up the question?" " In the obvious way; there can be but one way. Can the arts and sciences be otherwise than favourable to the prosperity of nations?" " That," said Diderot, " will only be to trample on the fallen; to swim with the tide: it would be far more striking to maintain the reverse." Rousseau went away, evidently struck with this thought, wrote his essay accordingly, and the rustic academicians gave him the prize.

Some time after, Holbach and Diderot met him in the Cours la Reine, and complimented him on the *ingenuity* of his performance. Rousseau made merry with the triumph of his paradox, and laughed at the simplicity of his judges. Some talk followed on the subject, and the weak side of his argument was pointed out. Rousseau grew angry. They met again, and the same topic was revived, but Rousseau, to their great surprise, was now changed, and fiercely maintained, as a truth, what he had formerly treated as a jest. Holbach observing this, " My friend," said he to Diderot, " Rousseau, in his first work, will make man walk on all fours." His prediction was verified.

Such was the origin of that man's opinions, whose motto was " *Vitam impendere vero;*" and these opinions have still some disciples, so ardent in their zeal, that they would willingly send to Vincennes all those who do not admire the *Confessions*.

are urged to action by violent and physical wants, and by passions connected with these wants; who exercise on each other no faculty but brute strength, whose effects are directly opposite to those of that equilibrating principle called Justice. If he had defined civilisation, agreeably to etymology (it comes from *civitas*, a city), to mean the settlement of men into contiguous habitations, within an enclosure formed to protect them from plunderers without and disorder within; a union which supposes the free consent of its members, the natural right of each to safety of person and property, and a *mutual compact* to regulate the conduct, and circumscribe the liberty of all, according to the rules of equity: he would thus have proved that civilisation is only that state of human society, in which persons and property are carefully protected; that this state implies a stable government and equal laws; while, on the contrary, those who want these blessings are the truly barbarous and uncivilised. He might have shown, that if civilised communities have vicious and depraved members, they are not produced by the social and political union, but are merely vestiges and remnants of that barbarous condition from which all nations arose: just as single men retain the bad habits instilled into them by a bad education.

In discussing the influence of science and literature on the social system, he might have maintained that the arts, especially those of poetry, architecture, and painting, are proofs of civilisation, and indications of

the prosperous condition of a nation. Yet he might have produced examples from Italy and Greece, to show that these arts may flourish under licentious democracy, and under military despotism, which are both equally savage stages. All that they want is a strong government, disposed to countenance and foster them. But this encouragement, carried to excess, is destructive of the government itself, as private virtuosi are ruined by lavishing too much time or money on pictures, furniture, or buildings. The fine arts, by engrossing too much of the national revenue, may subvert the government, and destroy social order, and examples of this he might find in the histories of Athens, Rome, and Palmyra. By this means he might have done mankind an important service, by giving its due direction and proper limits to taste, and countervailing that bias, which has been of late years so pregnant with mischief*. But let us return to America.

We have stated the reason why this mode of life is unfavourable to population. It would be a curious enquiry to ascertain the difference, in this respect, between savage and civilised life, and to calculate, in general, how many Indians are maintained on a given

* Individuals may ruin themselves by the misapplication of their fortune to objects of taste, but nobody ever heard of any *nation* who has done the same. Follies of a more gigantic and costly nature are usually the causes of national distress, and no where does it appear that Athens, Rome, or Palmyra incurred any injury, *as nations*, by their passion for building.—Trans.

quantity of land. Unluckily we want accurate data for such a calculation, but we have some which may possibly bring us somewhat near the truth.

Carver, who lived several months, in 1768, among the Noudowessies of the plains, tells us, with confidence, that the eight tribes of the nation were able to reckon up only two thousand warriors. This number of fighting men will allow us to suppose four thousand old men, women, and children, which, altogether, amount to six thousand. Now the tract of land occupied by these tribes appears to be four or five times greater than Pennsylvania. Stating it at only four times, and allowing Pennsylvania 50,000 square miles, which, quadrupled, makes 200,000, consequently, among the Noudowessies, there is less than one person to thirty square miles.

Maupertuis, in his travels towards the pole, computes the population of Lapland at one to three square miles, and the Laplanders live in peace, under a civilised government. This case, though the reverse of the former, tends to strengthen my conclusion. All the Canadian traders agree in reporting, that, as they go northward, beyond the 45th degree, the natives are so thinly scattered, and the land so sterile, that we cannot admit a higher population than we have given to the Noudowessies: but since the soil improves as we return southward, and the coasts of the South Sea appear more populous, let us allow one head to eighteen square miles, through all North America. That continent, excluding the United

States and Mexico, may be equal to six millions of square miles, which, at the foregoing rate, would maintain about 334,000 Indians. To satisfy the most scrupulous, let us double that number, and make 670,000, yet this is only the population of a small province of four or five thousand square miles, in a civilised kingdom*. This difference alone will enable us to determine which kind of life demands the preference: it likewise puts beyond the reach of controversy the question, whether savages have a right to refuse land to agricultural nations, who have not enough of their own†.

In their state of population, and in their mode of occupying territory, the Indians resemble the wander-

* According to this rule, the counties of Lancaster or York, in England, contains as many souls as all the aborigines of North America amount to, exclusive of Mexico and the United States. —Trans.

† The population of North America may be computed in the following manner:

The United States contain - -	5,215,000
Mexico is allowed by the Spaniards to contain	3,000,000
Canada, in 1798, about - -	200,000
Upper and Lower Louisiana - -	40,000
East and West Florida - -	40,000
Creeks, Chactaws, and Chickasaws -	24,000
Indians in the North-western Territory	15,000
The rest of the continent - -	600,000
Total	9,134,000

Thus the whole population is hardly more than nine millions, and the last item is probably over-rated by one-half.

ing Arabs of Asia and Africa; but the Bedwins, possessing land which bears nothing but grass, and this

South America appears to be less populous. Enlightened Spaniards do not compute the number, exclusive of the unsubjected natives, at more than - -	4,000,000
Brazil is reckoned to contain of Portuguese blood 500,000, and negroes 600,000 -	1,100,000
The Indians unconquered, if we consider their territory, cannot be allowed to exceed	1,000,000
The West Indian Isles - -	1,800,000
Dutch and French Guiana - -	75,000
Total	7,975,000

Thus we have about eight millions, which, if we raise to ten, will make the whole population of America twenty millions.

This estimate differs widely from that of Lalande, who, in the annals of years 8 and 9, gave the new world one hundred and eighty millions. In the years 9 and 10, he suddenly fell to sixty millions; and, in the present year (12), he has adopted my estimate, which he received through the hands of a common friend. He ought to act in the same manner in his estimates for Asia, which he peoples with five hundred and eighty millions. No doubt he assigns to China two or three hundred millions of these; but by the British estimates, published last year, the population of the country amounts only to fifty-five millions, and we may assign the same number to the cities of that empire: but by comparison with Europe, it may contain - 120,000,000

Asiatic Turkey may have -	11,000,000
Persia, according to Olivier -	3,000,000
Africa, including Egypt, can hardly exceed America, but let it be - -	30,000,000
America - - -	20,000,000
Europe - - -	142,000,000
Total	437,000,000

very scantily, are obliged to collect together, and tame harmless and docile animals, to treat them kindly, to subsist on their milk rather than on their flesh, and to make clothing from their hair rather than from their skin. The nature of their dwelling-place has led them to the shepherd's life, and temperance is enjoined them, under the penalty of dying with famine. Whereas the savage of America, inhabiting a soil which abounds with grass, shrubs, and trees, *finds it hard* to retain the captive beasts, while they can flee into the woods, and *more pleasant and convenient* to hunt than to feed them, he has been fashioned, by

Which is a total for the whole globe of less than five hundred millions*.

We need not wonder at the mistakes committed in reckoning the population of barbarous countries, since we have instances of enormous errors at home. Till 1792, the Corsicans were never reckoned at more than 158,000, as I have seen in the returns of the directory at Corte. At present, Corsica, in all official reports, stands at 230,000; and this difference I shall now account for. In 1793, some Corsican patriots found it convenient to have two departments, instead of one, for then France would pay double salaries of every kind. The amount total of 158,000 was given to Golo alone, and to Liamone were given the 72,000, which it may possibly possess, but they were already included in the sum total. Thus, in one day, Corsica almost doubled its inhabitants, though certain it is their numbers have dwindled since 1790. Yet this is an official account, accepted and published without scruple or objection.

* Macartney has proved the Chinese empire to contain three hundred and thirty millions, which would make the above total six hundred and forty-seven millions.—Trans.

the nature of his residence, into a hunter, a shedder of blood and devourer of flesh*.

From this difference in their modes of subsistence, a corresponding difference has arisen in their habits and propensities. On the one hand, the Arab shepherd, compelled to be sparing and frugal of the lives of his cattle, and accustomed to love them as his property, has, of course, a less ferocious character, is more fitted for social union, for acquiring the spirit of family, and notions of inheritance, both in property and power. Hence the condition of the Bedwins is far more improved. They have a government, in some cases, patriarchal, in which the head of the family has kingly power over his kindred; in others aristocratic, where the government is shared between the heads of several families. As the public manners are formed by the private, and as their pastoral domain requires only a slow and gradual enlargement, the temper of the tribe is less warlike; that is, it is not so quarrelsome and sanguinary. Property extending its rights and obligations to a greater number of objects, and the people having more occasion for communing together, their ideas of justice are more enlarged, the limits of their possessions are more carefully and accurately settled, hospitality flourishes, and, in short, they are, in all respects, a more civilised race.

* None of these reasons why the Indian is not a shepherd will hold good. The Tartars, in the same kind of country, have become pastoral.—TRANS.

The American *hunter*, who has daily occasion to kill and to eat the slain, by whom every animal is regarded as prey which he must be quick to seize, has imbibed, of course, an errant, wasteful, and cruel disposition. He is akin to the wolf and the tyger.—He unites with his fellows in troops, but not in fraternities. A stranger to property, all the sentiments springing from a family are unknown to him. Dependent on his own powers, he must always keep them on the stretch: and hence a turbulent, harsh, and fickle character; a haughty and untractable spirit, hostile to all men. He is constantly vigilant, because danger is ever present, and always ready to hazard a life which at best is held by so frail a tenure; he is equally indifferent to the past, which has been destitute of comfort and security, and to the future, from which there is nothing better to hope; and, lastly, he enjoys an existence concentering itself in the present moment. Such is the private, and from such is formed the national character. Always in want, yet thriftless; and always greedy, yet improvident, their situation leads them to extend their rights of hunting, and to encroach upon their neighbours. Hence a more warlike spirit towards strangers; while at home their imperfect ties, social and domestic, give birth to a democracy, turbulent and terrible, or, more accurately speaking, to a pure anarchy.

It is generally true that no right of property exists among the Indians, but it is to be admitted with some exceptions. Travellers agree in saying, that in the

wildest and most vagabond tribes, each one has an exclusive right to his arms, clothes, trinkets, and other moveables. It is to be remarked, that all these are acquired by his labour and ingenuity, and this species of property, therefore, arises from that which a man has in his own body and life, and is, consequently, natural and universal. All agree, likewise, in saying, that real or landed property is entirely unknown among them. This is true in relation to all the wandering and unsettled tribes, but it does not hold in the case of those whom a fertile soil, or any other circumstance, has rendered sedentary. This is the situation of the Creeks and Putewoatamies, and was found, a century ago, among the Hurons and Six Nations. These tribes reside in villages, in houses built of logs, mud, or stones, and in these dwellings the builder has an undisputed property, as well as in the gardens sometimes adjoining them.

It even appears, that, in some tribes, where tillage is regularly pursued, children and kindred inherit these, and consequently the rights of real property are fully established. In other unsettled tribes, all is heaped together, after the last possessor's death, and divided among his neighbours, by lot or by some other rule. If the village be deserted, no one retains any right to his hut or garden; but he has the rights of the first occupant, and of his own personal industry.

Exclusive of the village and its precincts, the territory is every where enjoyed in common, as we see

takes place, with respect to some portion of their lands, in some villages of France, in Poitou and Brittany, but much more extensively in Spain, Italy, and all the coasts of the Mediterranean. In Corsica there is a striking analogy, in this respect, to be found with the sedentary Indian tribes. There the greater part of the land, belonging to most villages, is held in common; on this land each one has a right to pasture his cattle, cut wood, and the like. But as tillage prevails somewhat more in Corsica, a fourth or fifth part is cultivated by the peasants in rotation. It is distributed among the families by lot, and each holds its assigned portion a year. As soon as the corn is gathered, the ground becomes common, or rather a scene of plunder and waste ensues, for all have a right to take away, but nobody to put in: nobody can build a house or plant a tree. It is resigned to the flocks, who range over it at will. As these chiefly consist of goats, who, as well as their guides, are very destructive animals, private fields are continually invaded, and the burthen of enclosure is daily encreased. Among the causes of the rude and barbarous condition, in which the Corsicans have, for so many ages, remained, the most powerful is the extent of its *commons*, which engross most of the island, and the insignificance and insecurity of private property.

To the same cause are owing the poverty and rudeness of the people who inhabit the *commons* of Brittany. The evils produced by this state of things, in Great Britain, have been forcibly displayed by sir

John Sinclair, to whose speculations on this subject I refer the reader. In Corsica, waylaying and murder has become, on this account, more frequent: the land being a desert, affords opportunities which otherwise would be wanting. The abolition of these common rights is the first step towards civilising this island. A second step should be to prevent the accumulation of land in a few hands; to make some portion of the ground indivisible or unalienable, so that no proprietor should hold more than one portion, as at Sparta. Small estates cannot govern themselves like great ones; in them the balance is too variable. The *custom of Brittany*, as it prevailed in the counties of Rohan and *Cornwall (Cornouailles)* had similar effects. There the land always went to the youngest son, the elder *sons* receiving a small portion, as they were supposed more able to acquire for themselves; and these provinces have always been the best cultivated. Corsica might easily support thirty thousand families in ease and dignity: at present it has that number, almost all of them idle and poor. Without independence, there can be no mental improvement, agriculture, or industry. I suppose it was on this account that Pascal Paoli made no change in the ancient institutions.

The Indians and the Corsicans are alike in another point. Of both, the villages are scattered over a wide extent, so that fifty houses will sometimes spread over half a mile square. The Indian adopts this system from a shyness and suspicion of his neighbours, from the dread of vengeance, secret or avowed, for slight

and unintentional offences. Daily experience gives them so bad an opinion of each other, that they meet as seldom as possible, and never go forth unarmed; and the law of retaliation adds new force to their caution and mistrust*. They who know Corsica know whether the same passions have not produced the same effects. The parallel might, indeed, be extended to many other particulars, but the people ought not, in this case, to be reproached for their evil habits: they are chargeable upon the Genoese government, whose scheme of administration was the most pernicious that ever existed. I was convinced, by a year's residence in this island, that it is worthy of a better fate, and that the people only want a few leading reformations in their laws to make them as industrious and civilised as any nation. The understanding of these islanders is as acute as any nation can boast, and their soil is much better than is commonly supposed: but how rare it is to find thirty years of peace and good government, in the course of three centuries, among any people!

From the nature of the savage state, wars must be frequent, and almost incessant. Cruelty is the cer-

* It is hard to conceive how these motives could lead to the use of separate and lonely habitations; how they could counterbalance the fear of foreign enemies, whose attacks must be facilitated by this mode of settlement. But Volney is an enthusiast against the savages, and is as zealous to depreciate, as Rousseau was to exalt their character.—Trans.

tain consequence of shedding much blood, or seeing it shed; but this cruel temper is promoted by other circumstances.

1. The selfish spirit which every Indian carries to war, arising from the reflection that the domain is common, the deer upon it his immediate subsistence, and, consequently, that the enemy is assailing all that is dear to him.

Among polished nations a small part of the people is directly affected by war. The rest are influenced through the medium of taxation, and are deprived of that with which they easily part. Among such a people, war is carried on with little rage or animosity. They fight and die from the impulse of vanity, and in the way of a trade or profession, by which they look for riches and honour. Whereas among savages, poor and few as they are, the whole tribe, and every member has his all embarked in the contest. War has two ends with them: one is to starve, and the other to exterminate the whole society. Of consequence, the soldier must feel all his energies awakened, and his whole soul must be engaged in the contest.

The ferocity of their wars is owing, secondly, to the fierce revenge and terror of shame, with which the warrior is inflamed. The party being always small, each one fights in the view of all his friends and enemies. Infamy as well as certain death pursues the coward, and personal competition is added to all the fervours which hatred and revenge inspire.

A third cause of their ferocity is their mode of warfare, in which no quarter is allowed or expected. To be killed is the least evil which the defeated can incur; for if he be only wounded, or made prisoner, he can merely expect to be scalped immediately, or burned alive and devoured piece-meal. I shall explain what I mean by scalping in the words of John Long, an English trader, who lived twenty years among the Indians.

" When an Indian strikes a person on the temple with a tomahawk, the victim instantly drops: he then seizes his hair with one hand, twisting it very tight together, to separate the skin from the head, and placing his knee on the breast, with the other he draws the scalping knife from the sheath, and cuts the skin round the forehead, pulling it off with his teeth. As he is very dexterous, the operation is generally performed in two minutes. The scalp is then extended on three hoops, dried in the sun, and rubbed over with vermillion.

" There are instances of persons of both sexes, now living in America, who, after having been scalped, by wearing a plate of silver or tin on the crown of the head, to keep it from cold, enjoy a good state of health, and are seldom afflicted with pains."—Long's Travels, p. 22.

Hence it appears that this operation is not always fatal. I myself knew an instance to the same effect, in a German settler at Gallipolis.

Scalps are trophies of military glory, which is proportioned to the longest string of them.

As to the practice of burning and devouring captives, every narration of an Indian war informs us that captives are fastened to a stake, near a pile of burning wood, there to be tormented in all the ways which savage vengeance can devise. Travellers relate incredible things of the joy displayed by the victors at these terrible sacrifices, the fury even of the women and children, and their emulation in cruelty. They describe the heroic firmness of the sufferers, who not only betray no pain nor fear, but brave their tormentors with the bitterest insults and sarcasms. They chant their own exploits, enumerate the friends and kinsmen of the spectators whom they have slain, or tortured in a much more ingenious manner, they upbraid them with ignorance in the art of tormenting, and at last, dropping piece-meal, they expire with taunts in their mouths, under the teeth of their enraged enemies. These tales would not be credited by civilised nations, were they not well authenticated, and posterity, who will know no savages, will treat such tales as fabulous*.

After this let romantic dreamers boast of the mildness and purity of their man of nature. Equally erroneous are such writers as Pauw, who attribute these

* Alas! what a mistaken notion that cruelty prevails only among hunting tribes, and that posterity will cease to be governed by the same ferocious passions, or prompted by them to the same excesses!—Trans.

displays of firmness to dull and naturally blunt sensations. They must surely, if this were the cause, have as little sensibility as oysters or trees. The truth is, the whole arises from a certain state of mind, when exalted by passion, instances of which are found in the political and religious martyrs of all nations. They are all in that state of feeling called fanaticism, which is a strenuous belief that we are in the right, and that our enemies are in the wrong: a conviction that stands in no need of reasoning, and is incapable of doubt. Indians, like martyrs at the stake, are buoyed up by pride, far above their surrounding foes, and a strife ensues between their wrath and his vanity, which shall hold out the longest. In every form of society, this sort of competition daily produces the greatest extravagances, as in gaming, war, and duels. The fanaticism of religious martyrs is commonly founded on the hope of futurity. The Indian wants this hope, and hence his courage surprises us the more, and may claim, perhaps, more applause: but he is urged onward by despair, the certainty that nothing can avert his fate. He is like those animals, who defend themselves with fierceness and obstinacy, when assailed in their last retreat. The weakest and most timid are then capable of prodigious efforts in their own defence. In the Indian, it is the combined impulses of fanaticism and necessity. On this double basis the Scandinavian Odin erected his religion. But a curious question remains to be solved, namely: in what physical state are the nerves, or the electric

fluid within them, by which the sense of pain is suspended or extinguished? This subject is well worthy the attention of medical schools; and those societies who speculate on moral topics would be equally well employed in discussing the nature and laws of fanaticism, in enquiring into the means, either in temperament or education, by which it is induced, and into the best mode of prevention or cure, and, finally, to ascertain whether its operation on society be more or less mischievous than the opposite spirit of doubt and incredulity.

The last circumstance which generates ferocity in an Indian is his education, and the pains which, in his earliest childhood, his parents and elders take to mould his inclinations and his feelings. "From their infant state," says Long, p. 60, "they endeavour to promote an independent spirit: they are never known to beat or scold them, lest the martial disposition, which is to adorn their future life and character, should be weakened: on all occasions they avoid every thing compulsive, that the freedom with which they wish them to think and act may not be controlled."

In this, as in the whole system of savage life, the grand mover is self-preservation. To make themselves bold protectors, the mothers spoil their children, who, when they grow up, will domineer over, insult, and even beat their mothers. They pass their nights in recounting the exploits of their relatives: they relate how many they slew, scalped, or burnt,

in their lives; and how, when captives at last, they bore their torments without shrinking. Sometimes they relate domestic quarrels, schemes of retaliation, and methods of revenge: thus they teach a perpetual lesson of hypocrisy, cruelty, suspicion, hatred, and revenge. They eagerly seize the opportunity afforded by the possession of a prisoner to exemplify these lessons, to tutor them in the art of tormenting, and initiate them in the taste of blood, in which these scenes usually terminate. It is easy to see what deep impressions such lessons must make; how successful they must prove in giving the young a licentious and cruel disposition, united with caution and dissimulation. They are even taught politeness, for they have rules of intercourse as rigid and minute as those of any court. In short, their whole system of tuition is designed to qualify them for gratifying their thirst of blood and revenge. On these points, their phrenzy is a subject of affright and wonder to the whites.

"An impartial mind," says Long, p. 27, "will require but little to be persuaded, that the Indians are superior to us in the woods: it is their natural element, if I may be allowed the expression; and a tree or river, of which their recollection never fails, guides them to the secret recesses of a deep wood, either for safety or the purposes of ambush. As they pay little attention to the rising or setting sun, it at first surprised me by what method they travel from place to place, without any material aberration: but this they soon explained, by assuring me, that they had not

the least difficulty in going from one spot to another, being governed by the moss on the trees, which always remains on the north side, but on the south it wastes and decays: they remark also, that the branches are larger, and the leaves more luxuriant, on the south than on the north side of the tree. The most enlightened part of mankind, I am persuaded, cannot be more exact in their mode of judging, or more attentive to the works of nature."——p. 29, "The disposition of the Indians is naturally proud and self-sufficient: they think themselves the wisest of the sons of men, and are extremely offended when their advice is rejected. The feats of valour of their ancestors, continually repeated and impressed upon their minds, inspire them with the most exalted notions of their own prowess and bravery: hence arises the firmest reliance on their own courage and power; and though but a handful of men, comparatively speaking, they are vain enough to think they can overthrow both French and English, whenever they please. They say the latter are fools, for they hold their guns half man high, and let them snap; but that they themselves take sight, and seldom fail of doing execution, which, they add, is the true intention of going to war."——p. 27, "Even the great Washington incurred their censure by his conduct, and gave occasion to an Indian chief, of the name of Thanachrishon, of the Seneca tribes, judging him by their own rules, to say, that he was a good-natured man, but had no experience."——p. 37, "How-

ever, with regard to bodily strength, they are excelled by many; and, even in hunting, the Virginians equal them in every part of the chace, though all the world allow them the merit of being good marksmen."—— p. 30, " The Iroquois laugh when you talk to them of obedience to kings, for they cannot reconcile the idea of submission with the dignity of man. Each individual is a sovereign in his own mind; and as he conceives he derives his freedom from the Great Spirit alone, he cannot be induced to acknowledge any other power. They are extremely jealous, and easily offended, and when they have been once induced to suspect, it is very difficult to remove the impression. They carry their resentments with them to the grave, and bequeath them to the rising generation. Those who have associated with them, though they may admire their heroism in war, their resolution in supporting the most excruciating tortures, and the stability of their friendships, cannot but lament the dreadful effects of their displeasure, which has no bounds. It is this violence of temper, which is generally in the extreme, that makes them so difficult to subdue, and so dangerous to encourage: too much indulgence they attribute to fear, and too much severity brings on resentment."——p. 76, " It is very strange that the thirst of blood should stimulate the human mind to traverse such an amazing extent of country, suffering inexpressible hardships, and uncertain of success, to gratify a passion, which none

but an infernal spirit could suggest* ; and when success has crowned his labours, that he should return with inconceivable satisfaction, and relate the transactions of his journey, with the greatest exultation, smiling at the relation of agonies which he alone occasioned. The most dreadful acts of a maniac cannot exceed such cruelty."

Thus it appears, that the virtues of the savage are reduced to mere courage in danger, to contempt of pain and death, and patience under all the evils of existence. These, no doubt, are useful qualities: but they relate to the individual himself, they centre in his safety or felicity, and have no relation to the benefit of others. They are indications of a life of danger and distress; a state of society so depraved, that its members look not for succour and sympathy to each other, but are driven, for solace, into despair or indifference. Of the aid or compassion they cannot procure they make themselves independent, and what they cannot get they learn not to wish, and when they cannot live they consent to die.

It may, indeed, be urged that this people, in their leisure moments, laugh, sing, and play, and disturb themselves with no repinings for the past, nor care about the future. Does it not follow that they are happier than we? To this Little Turtle shall answer, in his own words: "No doubt they have pleasures of their own sort."

* See Carver, chap. 9 and 16, and Hearne's Journey.

Men are such pliant creatures, and habit is so strong with him, that in every situation there is some posture or some thought which amounts to temporary ease, some moments in which he feels a kind of enjoyment, by comparison with dreaded or experienced suffering. If it be happiness to laugh, sing, and dance, soldiers may justly claim the meed of perfect happiness, since none are more careless and merry than they, even in the midst of perils, or on the eve of battle.

During the gloomiest period of the revolution, the tenants of the Conciergerie were happy, since they were in general more gay and careless than their keepers, or than those abroad, who only feared a like fate. The terrors of those at freedom were proportioned to the pleasures they wanted to preserve.—Those in prison felt but one care: that of saving their lives. Every moment of suspence was an acquisition, and each day the prisoner blest himself for being still among the living. Such is pretty much the state of a soldier in war, and such is always the condition of savage life. If this be happiness, wretched is the country in which it is an object of envy.

More advantageous notions cannot reasonably be formed of Indian liberty. He is only the slave of his wants, and of Nature, froward and unkind. He has neither food nor rest at command. He must continually encounter fatigue, hunger and thirst, heat and cold, and every inclement vicissitude. His ignorance engenders a thousand errors and superstitions,

unknown to civilised nations, of which his tranquillity is the hourly victim.

The limits to which I have confined myself do not permit me to enter into the minute details of this important subject. I shall content myself with saying, that the more we study the manners of savage nations, the greater light is thrown upon the nature of man, and the history and origin of society, and especially on the situation of the nations of antiquity. I have often been struck with the analogy subsisting between the Indians of North America, and the nations so much extolled of ancient Greece and Italy. In the personages of Homer's Iliad, I find the manners and discourse of the Iroquois and Delawares. Sophocles and Euripides pourtray, most faithfully, the opinions of the *red men*, on necessity, destiny, and the miseries of human life. But the opening of the history of Thucydides, in which the author gives a concise view of the Greeks, before and after the Trojan war, up to his own times, affords a picture, whose similitude to the scenes I have been describing is so forcible, that I cannot resist the temptation of quoting it.

" It is certain, that the region now known by the name of Greece was not formerly possessed by any fixed inhabitants, but was subject to frequent migrations, as constantly every distinct people easily yielded up their seats to the violence of a larger supervening number. For, as commerce there was none, and mutual fear prevented intercourse, both by sea and land; as then the only view of culture was to earn a

penurious subsistence, and superfluous wealth was a thing unknown; as planting was not their employment, it being uncertain how soon an invader might come and dislodge them from their unfortified habitations; and as they thought they might every where find their daily necessary support, they hesitated but little about shifting their seats. And for this reason they never flourished in the greatness of their cities, or any other circumstance of power. But the richest tracts of country ever were more particularly liable to this frequent change of inhabitants, such as that which is now called Thessaly, and Bœotia, and Peloponnesus mostly except Arcadia, and in general every the most fertile part of Greece. For, the natural wealth of their soil encreasing the power of some amongst them, that power raised civil dissensions, which ended in their ruin, and at the same time exposed them more to foreign attacks. It was only the barrenness of the soil that preserved Attica through the longest space of time, quiet and undisturbed, in one uninterrupted series of possessors. One, and not the least convincing, proof of this is, that other parts of Greece, because of the fluctuating condition of the inhabitants, could by no means in their growth keep pace with Attica. The most powerful of those, who were driven from the other parts of Greece by war or sedition, betook themselves to the Athenians for secure refuge, and as they obtained the privileges of citizens, have constantly, from remotest time, continued to enlarge that city with fresh accessions of inhabitants, in-

somuch that at last, Attica being insufficient to support the numbers, they sent over colonies into Ionia.

" The custom of wearing weapons once prevailed all over Greece, as their houses had no manner of defence, as travelling was full of hazard, and their whole lives passed in armour, like barbarians. A proof of this is the continuance still in some parts of Greece of those manners, which were once with uniformity general to all. The Athenians were the first who discontinued the custom of wearing their swords, and who passed from the dissolute life into more polite and elegant manners.

" Sparta is not closely built, the temples and public edifices by no means sumptuous, and the houses detached from one another, after the old mode of Greece.

" Such are the discoveries I have made concerning the ancient state of Greece, which, though drawn from a regular series of proofs, will not easily be credited: for it is the custom of mankind, nay even where their own country is concerned, to acquiesce, with ready credulity, in the traditions of former ages, without subjecting them to the test of sedate examination. Thus, for instance, it is yet a received opinion, that the Lacedæmonian kings had each of them a double and not a single vote in public questions; and that, amongst them, the Pittanate was a military band, which never yet existed. So easy a task to numbers is the search of truth, so eager are they to catch at whatever lies at hand!

" And as for the actions performed in the course of this war, I have not presumed to describe them from casual narratives or my own conjectures, but either from certainty, where I myself was a spectator, or from the most exact informations I have been able to collect from others. This indeed was a work of no little difficulty, because even such as were present at those actions disagreed in their accounts about them, according as affection to either side or memory prevailed. My relation, because quite clear of fable, may prove less delightful to the ears. But it will afford sufficient scope to those who love a sincere account of past transactions, of such as in the ordinary vicissitude of human affairs may fully occur, or at least be resembled again.

" After the engagement at sea, the Corcyreans having erected a trophy upon Leucimna, a promontory of Corcyra, put to death all the prisoners they had taken, except the Corinthian, whom they kept in chains*."

In this picture there is not a single line that is not verified in the history of the American tribes, except only what relates to Attica, whose peculiar advantages were too remarkable to be omitted.

A very interesting and instructive parallel might be drawn between the savage nations of America and the primitive states of Italy and Greece. It would dissipate a great number of illusions, by which our

* Smith's Translation of Thucydides.

judgment is misled in the ordinary modes of education. We should be enabled to form just notions of the *golden age*, when men roamed about naked, in the woods of Thessaly and Hellas, feeding upon herbs and acorns. We should see, in the early Greeks, just such savages as those of America, placed in a similar country: for Greece, when overspread with trees and bogs, was much colder than at present. We should learn that the Pelasgi, a race dispersed from the Alps to Taurica, were merely the primitive wild hordes, wandering and hunting for their bread, like Hurons and Algonquins of the present age, or the Celts and Germans of old. It would be easy to perceive that colonies of more enlightened strangers, from the Phenician and Egyptian coasts, settling among them, had nearly the same intercourse with them, as the first New England and Virginian colonists had with the untutored natives. Thus we should be able to explain the revolutions among these people; the spirit of their tribes, where every stranger was an enemy, and every robber a hero; when force was the only law, and the only virtue bravery; when every troop was a sovereign state, and every jumble of huts was a city. We should see the origin of that pride and ostentation, treachery and cruelty, sedition and tyranny, which the Greeks display, in every period of their history; the sources of those fallacious notions of virtue and glory, sanctioned by their priests, and blazoned by their poets, which make war and its bloody trophies the only aim of manly ambi-

tion, the true road to fame, and the proper object of idolatry to the blind and deluded multitude. Since, of late, we have been seized with a passion for imitating these people, and regard their morals and manners, like their poetry and arts, as the models of all perfection, we should, finally, perceive that we are worshipping the spirit of a rude and barbarous age.

This analogy even extends to the religion and philosophy of Greece: for the Indian has reduced to practice all the precepts of the stoic school. If any should infer, from this similitude, that the Indians are sages, I should take leave, with as good reason, to infer, that such sages were no better than Indians. The true conclusion would be, that the state of society in which such harsh philosophy was propagated, for the sake of making life supportable, could not be superior to the miserable condition of Creeks and Chactaws. My inference would be justified by the whole history of the Greek tribes, even at their brightest periods, by the long series of their wars and seditions, till their conquest by the Romans, *another race of savages* from Italy, who, *in their morals, policy, and aggrandizement, bear a striking resemblance to the Six Nations**.

* The above observations will raise a smile in most readers. Volney's abhorrence of Rousseau, and his *man of nature*, has hurried him to the contrary extreme. These two extremes, like all others, are nearly allied, and we here find him maintaining, that the most polished nations of mankind are not a whit wiser, better, or happier, than the Hurons and Algonquins.—Trans.

There is no regular system of religion among the Indians, because each one employs the liberty allowed him, of making a religion for himself. The introduction of christian missionaries appears to have somewhat modified their primitive opinions. As far, however, as we can collect consistent accounts, from early historians and late travellers in the north-west, the following appear to be the outlines of Indian mythology:

First, they believe in a great *Manito*, or genius, who rules the world or universe, that is, the air and the earth, for these constitute their universe. This being, dwelling somewhere above them, governs the world, though with little trouble to himself; sends wind, rain, or fair weather, according to his fancy; sometimes makes a noise, which is thunder, for his own pastime; takes as little heed of men as of other animals; dispenses good or ill by chance or at random, leaving the world meanwhile to fate or necessity, whose laws are absolute over all things. They commonly call this being the *Master of life*, or *He who made us*, though this title they may have gotten from the missionaries.

Under this supreme power are numberless *Manitos*, who traverse earth and air, and govern all things, each having his separate province. Some of them are good, and all the good that happens comes from them; while others are bad, and all the evil that befals us is their work. All the worship they know is offered to the latter, whose wrath they strive, by their offerings or prayers, to appease or avert, as men en-

deavour to soothe the envious or morose among themselves. They pay little or no homage to the good Manitos, because these act from their own benign nature, and would do just as they do without the prayer.

"Primus in orbe deos fecit timor."

The dread of these mischievous deities is their most constant companion and greatest tormentor. The boldest warriors are, on this head, as timid as the women and children. A dream, a phantom, a mysterious cry, equally alarms them; but as there are always knaves where there are dupes, every tribe has a juggler, whose trade is to expound dreams, and to negociate between the Manito and the votary. Like valets in old comedies, he carries messages between parties invisible to each other; and this office, we may well suppose, is not unattended with profit. The missionaries and these jugglers are particularly odious to each other, and each stigmatises his opponent as a knave and impostor. Though so familiar with these genii, they cannot describe their form or nature. They suppose them to be bodies of a light, volatile, shadowy texture. Sometimes they and their disciples will select a particular one, and give him, for a dwelling, a certain tree, serpent, rock, or waterfall, and him they make their Fetish, like the Africans of Congo.

They generally admit the notion of another life*. After death, they shall go, they think, to a country where game and fish abound, where they can hunt without toil, walk without danger of an ambush, regale upon fat meat†, and, in short, pass their time amid those enjoyments which they valued here. The northern tribes place their heaven in the south-west quarter, because their fair and mild weather comes from thence. The missionaries tell us, that they have notions of reward and punishment, but this, to deserve credit, demands more impartial testimony.

These outlines are sufficient to show the strong analogy between the mythological notions of the American Indians and the Asiatic Tartars, as the latter have been described by the recent Russian travellers. The analogy between them and the notions of the Greeks is no less apparent. We discover the chief Manito in Homer's Jupiter. The latter, however, leads not the poor, unsettled, melancholy life of the Indian Jove, but enjoys all the magnificence of the court of Ethiopia, or rather of the hundred-gated Thebes, whose gorgeous secrets have been un-

* This does not quite agree with an assertion which occurred before, that the Indian captive at the stake is not supported, like the christian martyr, by the hope of another life.—TRANS.

† People who frequent the woods come to prefer fat to lean. The lean digests too quickly, on which account the Canadians term it *viande-pain*, meat-bread. I have experienced this myself, and, like them, soon began to like a slice from a bear better than the wing of a turkey.

folded to us by the enterprise and curiosity of the present age*.

In the other Manitoes we perceive, no less clearly, the subordinate divinities of Greece, the nymphs and demons of the waters and the land. I mean not to insinuate that the Indians have borrowed their doctrines from Scythia or Greece. Shamanism, or the system of Buddtha, may possibly have spread itself throughout the old world, where it is found even at the extremities of Spain, Scotland, and Denmark; but it is quite as possible that it is a native product of the human mind, since it everywhere bears an intimate relation to the habits and condition of the people who profess it†.

* See Denon's Travels.

† The christian missionaries, catholic and protestant, among the Indians, have exerted great pains to convert them. The artful system of the jesuits was the most successful in bringing them to an outward form of worship, but the *plain good sense* of these people could never admit incomprehensible dogmas. They went to mass, and said the formularies prescribed, for the sake of the bread bestowed upon them, by which their hunger was gratified without labour; but I never heard, in the United States, of a single Indian truly become a christian. When, therefore, a celebrated author among us builds a recent romance on the nun-like devotion of a young squaw, he has violated all the laws of probability. If, indeed, he only aimed at pleasing a party, and effecting a certain purpose, he has adopted the right method.—V. It is amusing to compare this passage, in which the author gives to his savages a *plain good sense*, superior to the wisest Europeans, for such have adopted the dogmas he speaks of, with the picture before given of their gross superstition, credulity, and ignorance.

The great difficulty in believing a transmission of religious ideas through many generations, consists in the total absence, among savages, of records or writings of any kind. They know of nothing past but by oral tradition, and, in this form, the truth is strangely distorted in its passage from mouth to mouth. Very recent facts are totally disguised when propagated in this manner. In treating of the Arabs*, I have shown to what degree traditions are distorted and changed by the people of the east, though a contrary opinion is cherished by some learned men, especially theologians. I have shown that among these people, few even remember their own age, or the incidents of childhood : a negligence and forgetfulness common to the ignorant of every nation ; nay, these are qualities inseparable from human nature†.

He never heard, it seems, of what is familiarly known to all who have taken the trouble to attend to the history of the moravian missions in America. But Volney's zeal against Rousseau on one hand, and the preachers of religion on the other, has led him, in this part of his work, into many contradictions and absurdities.—Trans.

* See Travels in Syria and Egypt.

† The most unlettered American, and one who easily forgets his own age, or his brother's christian name, yet knows with certainty, though no book contains it, from what part of Germany or England his ancestor came, a hundred and fifty years ago. Volney infers too much from a man's negligence or forgetfulness in his own concerns, which are not impressed upon his mind by frequent repetition, as to his aptness to forget or distort national events, which are the themes of eternal talk and public recitals. —Trans.

The Indians of America afford additional evidence of this truth, for every body I consulted agreed in assuring me, that they have no clear remembrance or tradition of a fact which happened a hundred years ago. And, indeed, what else can be reasonably expected from their roving life, the calamities of war, emigration, and famine, to which they are so liable, and from their incurable negligence ?

There is only one species of memorial among them, which consists in linking phrases together, which are equal in their syllables, and rhyme together. These may be styled *verses*, and are either spoken or sung. By means of measure and rhyme, a consistency and permanence is given to meanings, which they would otherwise want. To this rude and artless original may the divine art of poetry be traced, and hence its first and most ancient essays are extravagant tales of gods and ghosts, of battles and piracies, adventure and revenge. Such are the songs of the bards of Odin, Fingal, and Achilles : though the latter was superior to the rest in genius and knowledge, their stories accord with the spirit of that barbarous age, ignorant, superstitious, and ferocious, in which they were first compiled.

It may be said, that the Indians are not without a sort of hieroglyphics, by which they transmit ideas to a distance. They depict a Frenchman by the figure of a man with his arms a-kimbo, a prisoner by a figure with his arms bound, but the defects of such representations are obvious. The truth is, that they have no

means of distant communication, no monuments nor traces of antiquity. There is not, in any part of North America, but Mexico, any building, or remains of building in brick or stone, to testify the existence of ancient arts. A few earthen barrows, or tumuli, which serve as tombs, and some lines, or entrenchments, including from one to thirty acres, are all that exist at present. I have seen three of these mounds: one at Cincinnati, and two in Kentucky, on the road from Cincinnati to Lexington. They are merely mounds of ditches, four or five feet high, and eight or ten broad at bottom. Their figure is irregular, sometimes oval, sometimes round, and afford no indication of skill in the military or in any other art. The largest of these is at Muskingum, and is square, and of great dimensions, but from the account of it given by Dr. Barton, in his Observations on Natural History*, it possesses neither bastions nor towers, as has once been said. They must have been mere entrenchments, made for defence, such as Oldmixon reports to have been usual among the natives, at the first arrival of the Europeans, when their dwellings were more fixed, and their numbers greater and more equal. They have all been produced by the same causes, and appear to have required no tools but baskets and hoes.

As to the tumuli, I examined one near Cincinnati, about half a mile west of the fort. It is covered with

* Part I, Philadelphia, 1787.

trees of spontaneous growth. It reminded me of the barrows I had seen on the borders of Syria, though the latter are stronger, being formed to support towers. Many are found, bearing a nearer resemblance to the Indian, in Russia and Tartary. Many of these tumuli have been opened: they are found to contain nothing but human bones, with the bows, arrows, and tomahawks of the savage warrior. General St. Clair cut down one of the largest trees growing on them, and found it to contain upwards of 432 annual rings, which would argue a date as early as 1300 or 1350.

More accurate enquiries must, however, be left to the learned in America, who enjoy the best opportunities of settling the truth.

Language is the most instructive and unerring of all the monuments of rude nations. Dr. Barton has published a curious dissertation on this subject*, in which he compares several of their dialects with each other, and with those of the Tartarian nations of Asia. He was aided in this task by the collections, made by Dr. Pallas, of words in near three hundred Asiatic languages, by order of the empress Catherine†.

* See New Views of the Origin of the Nations and Tribes of America, London, 1798.

† This work, whose object was to infuse some light and order into the chaos of languages, was printed in Russian characters, by which the utility of the work is considerably circumscribed, as these characters are confined to a nation not very rich in books, and but little advanced in the sciences. The Roman character

These disquisitions have led Dr. Barton to several important conclusions, though all of them do not appear to be equally well-founded. I cannot discover the affinity inferred by him between the language of the Caribbeans, Brazillians, and Peruvians, and those of the Putewoatamies, Delawares, and Six Nations, merely from a likeness between two or three words. I agree with him more fully in the resemblance he traces between the latter and the dialects of north-eastern Asia. Much credit, however, is due to him for opening a mine of valuable and curious knowledge, a mine which ought to be explored more deeply, and by the united efforts of many learned men. It is extremely desireable that the American government, impressed with the importance of the subject, would institute a society or college of five or six accomplished linguists, to be employed solely *in collecting and forming vocabularies and grammars of the Indian languages*. In a few ages, the *red men* will probably perish for ever. Vast numbers have already disappeared, and if the present opportunity be lost, the only clue to the affinity between the natives of

is diffused through the greater part of Europe, and will soon supplant the Gothic character in Germany, and become universal in America. Will it not be eligible for the Russians to adopt it likewise, and thus join themselves to the enlightened part of mankind? For the sounds peculiar to themselves, they might adopt the same mode pursued by the French, in naturalising the Arabic, Turkish, and Persian alphabets, that is, by giving new letters to such sounds. Much trouble and expence would thus be avoided.

America and those of the north-east of Asia will be lost. The expence of such an institution would be of little moment to a frugal and wealthy people, and, indeed, would be ultimately a source of gain, by the benefits it would afford to the trade in books*.

In submitting this scheme to the members of the government, the friends of science and literature, I am the more in earnest, because there prevails throughout their nation a strong prejudice against affording any public or political encouragement to literature. This the people generally imagine should be left, like other arts or pursuits, to the choice and resources of the individual. The parallel they suggest between this and the common arts of subsistence is extremely fallacious, since to cultivate the sciences with spirit and

* The American citizen will smile at this proposal. The *great* importance here bestowed on the business of collecting the dialects of barbarous tribes, who are hastening to oblivion, for the sole purpose of throwing a faint light on the question whether these tribes originally came from the north of Asia, will hardly be felt by the busy merchant, artizan, or farmer, or by their public representatives or secretaries. This is an amusing instance of the way in which men like Volney would employ political authority and the public revenue, and of the pursuits which a government ought, in their opinion, to deem it an important duty to promote. It reminds us of the virtuoso who petitioned parliament to hold its future sittings at Stonehenge, to call the king Pendragon, and oblige the universities to confine all their instructions, and the courts of law to conduct all their processes in the pure old dialect of Wales. But though Volney will be thought by many to overrate the importance of his subject, enlightened minds must acknowledge that it is a curious and instructive one.—Trans.

success requires the total devotion of a man's time, and the renouncing of all other means of fortune or subsistence. He must be exempt from the cares both of riches and of poverty. For this end he must be above want, and have a competence provided for him. The salaries allowed by princes, and the funds appropriated to collegiate institutions answer these ends. France is indebted for all her intellectual superiority in Europe to this system, and the beneficial influence of the sciences on commerce and manufactures, on public and private prosperity, has been so evident, that this system remained inviolate through all the shocks and changes of her government. The United States may acquire the same illustrious pre-eminence in the new world, by adopting the same system. A hundred thousand dollars a year is a moderate expence for so opulent a people: yet this would create a college of sages*, by whose intellectual labours, not only their native country but the world might be extensively benefited. They would do an eminent service, were it merely in freeing their nation from the reproach of having grown visibly indifferent to the sciences and useful arts, since its revolution, and of suffering the education of youth to sink into disorder and neglect. This charge has been made upon this nation, not only by strangers, but by the most judicious and enlightened of its own citizens.

* It would be an ample subsistence to *a hundred persons*, who might each gratuitously educate twenty youths, in all *two thousand* pupils. What a cheap, yet what a glorious institution!—Trans.

I shall here add a vocabulary of the Miami tongue, a dialect which appears to belong to the language of the Chippewan tribes, who, Mackenzie tells us, believe themselves to have originally come from the north-east of Asia. The collection is very imperfect, but it is perhaps sufficiently extensive to supply the learned linguists of Germany and Russia, who are versed in the Asiatic dialects, with the means of comparing them together. If it serve to facilitate some discoveries in that quarter, or awaken the liberal zeal of the government of the United States to pursue this interesting subject, my wishes will be accomplished.

VOCABULARY

OF

THE MIAMI LANGUAGE.

IN the following list, I have given the sound of the Spanish j to the x.

H has a strong aspiration.

Th is English in *path*.

I have added to the sounds of these words, according to the French alphabet, some examples of the English mode of pronouncing the same sounds, to show the confusion arising from the different powers assigned by different nations to the same letters.

Where the English pronunciation has a B subjoined to it, it was taken from Dr. Barton; in other cases, from Mr. Wells*.

* I have retained Volney's orthography, because to attempt to substitute English sounds instead of them would have been an arbitrary and capricious method.—TRANS.

English.	*Miami after the French Orthography.*	*Miami after the English.*	*Remarks.*
I	Nêlah	Nalaugh	ê is equivalent to the French ée, that is, to the long e.
Thou and you	The *you* is used for both.		
He, she	See *they*	Awaleaugh	
We	Kêlônah	Calonaugh	
You	Kêlah	Calaugh	
They	Aouèloùa (oua short)	Awalewaugh	
Mine	Nêlah-néneh	Nalaugh-nenigh	
Thy	Ki. See *Your*		
His, hers	Aouèla-néneh	Awalelah-nennegh	
Our	Kêlônah	Calonaugh	
Your	Kêlêla-néneh	Kalelaugh-nennagh	
Their	See *His*		
Father (my)	Noxsâhé	Nosh saugh Noch sau B.	
Fathers (the)	Oxsema		
Mother (your)	Kekiah	Kakecaugh	
Mothers (the)	Akêmêmah	Aukeemeemauh B.	
Son	Akouissimà		
His son	Akouissâleh	Augwissaulay	
His daughter	Atanâléh		
My brother	Ouedsà milâné	Sheemah, taken for *sister* B.	
Our brother	Ouedsa-monkouà		
My sister	Ningo chema		
Their sister	Agoz-chimouâlé	Augoshim wauley	

English.	*Miami after the French Orthography.*	*Miami after the English.*	*Remarks.*
My husband	Nêna pêma. Literally *master of weakness.*		
My wife	Ninouéouah	Neeweewah B.	
A woman	Métamsah		
A man	Helaniah	Hellaniare	In Delaware, Lenno, Chippeway, Lennis, Shawnese, Linni. Why were the ancient Greeks called *Hellenes?* And a Tartar tribe *Alani?*
A little boy	Apilossah	Apeelotsaugh	
An old man	Kéocha	Kaowshaw	
One	Ingôté	Ingôtay	
Two	Nîchoué	Neshsway	
Three	Nexsoué	Nessweh	
Four	Nîoué	Neeway	
Five	Yâlanoué	Yallawnwee	
Six	Kakotsoué	Cau cutsweh	
Seven	Souaxtetsoué	Swattetssweh	
Eight	Pollâné	Pullawneh	
Nine	Ingôté-ménéké	Ingotim maneeka	
Ten	Matatsoué	Mautotssweh	
Head	Indêpékòné		
Eye	Kéchékoué		
Nose	Kiouâné		
My nose	Nin-kiouâné		
Your nose	Ki-kiouâné		
Ear	Taouâké		
Forehead	Margaouinguilé		
Hair (of the head or body)	Nélissah		

English.	*Miami after the French Orthography.*		*Remarks.*
Mouth	Tonénéh		
Tongue	Ouélâné		
Tooth	Ouipîtâh		
Beard	Messetoningué		
Hand	Onexkâ		
Foot	Kâtah		
Skin	Lôkaié		
Flesh	Ouioxsé		
Blood (See *Red*)	Nixpékénoué		
Heart	Tâhé		
Belly	Moïgué or Moïtcze		Pronounced in the Russian manner
Life	Mahtsanéouingué		
Death	Nahpingué	Nipon (*He is dead*)	It is peculiar to the northern tribes to associate the three ideas of sleep, cold, and death
Sleep	Nipangué	Nipahanoué (Coldness)	
To kill	Anguéchéouingué		
Day	Ispêté		
The sun	Ispêté-kilixsoua (*Light of day*)		
Night	Pekontèoué		
The moon	Pekontèoué-kilixsoua (Light of Night)		
Morning	Cheïpaoué		
Evening	Elakouîkéx		
A star	Alangouâ		
The firmament	Kechekoué		
Wind	Alamthenoué		
Thunder	Tchingouia		
Rain	Petilenoué		

English.	*Miami after the French Orthography.*
Snow	Monê toua (a genius or spirit)
Ice	Achonkôneh
Hot	Chilitèoué
Cold	Nipâhanoué
Summer	Nihpênoué
Winter	Piponoué
The earth	Akinkeoué
An island	Menàhanoué
Water	Népé
Fire	Kohteoué
Flame	Paukouâleoué
A river	Sipioué
A lake	Nipihsi
A rivulet	Maxtchékomeké
The sea	Kitchi-kâmé
A mountain	Atchioué
A hill	Ispotêhkiké
A tree	Metèhkoué
Trees	Metèhkonah
Wood	Taouânè
A forest	Mtehkoke
A track (of game)	Pamehkaouangué
To hunt	Donamahoua
The chace	Nahtonamaouingué
A bow	Mêtèhkouapa
An arrow	Tàouanthalouà
The leaves (that) fall	Mechipakoua Papintingué
(A man) falls	Mejechenouâ
Game	Aouàssâh
Fish	Kikonassah

English.	*Miami after the French Orthography.*	*Remarks.*
A warrior	Aâthiâ	
War	Mejékatoué	
To go to war	Dopaléouah	
A tomahawk	Takâ-kané	
To paint the face	Ouèchihouingué	
A knife. Knives	Malsé. Malsa	
To scalp	Laniok-koué	Koué (the hair of the head.)
A prisoner	Kikiouna	
A path	Mioué	
A tobacco-pipe (calumet)	Poâkâné	
Smoke	Axkoleoué	
A house	Ouikâmé	
A boat	Missôlé, *in the plur.* Missola	
A net	Sâpâ, *plural* Sapake	
Dried meat	Pohtekia	
Smoked meat	Oxkolé Saminguiá	
A tomb	Eouissi-kâné	
Peace	Pèhkokia *(good, abundance.)*	
Good (the subs.)	Pèhkôké	
Bad (the subs.)	Mélèoxké	
(a) Good (man)	Tipêoua	
Wicked	(Fortè) Matchi*	
Sweet†	Ouêkapanké	

* In general, all words implying beautiful and good begin with a p, and, on the contrary, those that signify bad or ugly with an m.

† They call the bee the fly that makes sweet: they say that it is not a native of the country, and precedes the settlers a year. *Amohouia* is applied to all the genus. *Honzaoue-amohouia*, yellow fly, signifies a hornet.

English.	*Miami after the French Orthography.*
Bitter	Ouèssakangué
Long	Kenouake
Short	Ixkouaké
(a) High (hill)	Ifpatingué
High (in the sky)	Ifpatingué
Low	Mataxké
Slow, easy	Quêhkeoué
Ready	Kinsehkaoué
A cloud (rapid)	Kintche seoué
(a) Deep (river)	Kenonoué
Smooth	Têtipaxkeoué
Great	Manchôké, kitchi
Little	Apiliké
Broad	Metchahkeoué
Narrow	Apassiaoué
Heavy	Ktchokouâné
Light	Nanguétchéoué
Iron	Kepikâtoué
Copper	Naxpekacheke
Gold	Honzaouéchoulé
Silver	Choûlé *or* Tsoulé
Lead	Lontsàh
A stone	Sâné
White	Ouàpekingué
Black	Mankateouekingué
Red	Nèhpèkékingué
Blue	Ixkepakingué
Yellow	Honzaouékingué
Green	Anzanzékingué
A wild ox, or buffalo	Alanantsoua
A beaver, or little deer	Monsoké

English.	*Miami after the French Orthography.*
A bear	Moxkoua, Maxkôké *in the plur.*
A dog	Alamo, *plur.* Alamòké
Indian corn	Mintchepé
A bird	Ahouèhsensa
A friend	Aouinkanemah
An enemy	Kitankiamouna
Love	Tépaletingué
Laughter	Kéouélingué
To laugh	Kéouéleouàh
To weep	Sèhkouingué
A tear	Sèhpingouah
To speak	Kilakilaxkouingué
A discourse	Atchimouna
To walk	Pampelingué
To run	Mahmikouingué
To breathe	Nêssingué
To blow	Alamsenoué
To sigh	Kêouênéoua
To fear	Kouahtamingué
The mind, spirit, or soul	Atchipaïà. That is, *a flying phantom.*
God	Kitchi Manêtoua *(the Great Spirit)*, or Kajehelangouâ *(He who made us)*
Genii or spirits	Manêtouâ, analogous to the *manes*, *mani-um* of the Romans
The devil	Matchi manitou
Beautiful	Penkesina
Ugly	Molëïousina
A good man	Tipêoua-heleniah
A good woman	Tipêoua-metamsa
The savages	Metoxthéniaké (born of the soil)
The Europeans	Ouâbkilokèta (white skin)

English.	*Miami after the French Orthography.*
The French	Mêhtikôcha (*Ouêmistergôch*, a builder of ships, in the Chippeway)
An Englishman	Axàlàchima
An American	Mitchi-Malsà (great knife
Yes	I-yè
No	Moxtché
With	Mâmàoué, in Arabic *mà*

They have not the verb *to be*.

Their adjectives are of the common gender, as in English. See the example, *a good man*, *a good woman*.

In general, the plural of substantives is formed by adding to the singular the final syllable ké. *Metamsa*, a woman; *Metamsaké*, the women.

The verb To Eat.

I eat	Niouissini
Thou eatest	Kiouissini
He or she eats	Ouissinioua
We eat	Niouissini mina
Ye eat	Kiouissini moua
They eat	Ouissiniouàké
I have eaten	Chaïani ouissiné
Thou hast eaten	Chaïaki ouissiné
He or she has eaten	Chaïaé ouissinoua
We have eaten	Chaïaé kiouissini-mina
Ye have eaten	Chaïaé kiouissini-moua
They have eaten	Chaïaé oussiniouaké
I shall or will eat	Nouissini kâté
Thou shalt or wilt eat	Kiouissini kâté

English.	*Miami after the French Orthography.*
He or she shall or will eat	Ouissinioua kâté
We shall or will eat	Kiouissini mina-kâté
Ye shall or will eat	Kiouissini-mo-kâté
They shall or will eat	Ouissiniouaké kâté
Eating	Ouessiningué
Hunger	Aïxouingué
I am hungry	Indâïexkoui

The verb To Drink.

I drink	Némênê
Thou drinkest	Kimênê
He or she drinks	Mênouà
We drink	Kimênê mena
Ye drink	Kimênê moua
They drink	Mênó-ké
Drink	Mêningué

The verb To Beat.

I beat	Indâné èhoué
Thou beatest	Kidâné èhoué
He or she beats	Anè èhoué
We beat	Kidâné èhouemena
Ye beat	Kidâné kioué (or hioué)
They beat	Anêhé èhouaké

The passive voice.

I am beaten	Indâné ekoua
Thou art beaten	Kidâné ekoua
He or she is beaten	Anè haouá

English.	*Miami after the French Orthography.*
We are beaten	Kidâné ekoua
Ye are beaten	Kidâné ekoha
They are beaten	Anè haouaké
I have been beaten	Indâné nehèkoua
Thou hast been beaten	Kidâné nehèkoua
He or she has been beaten	Anènè haoua
We have been beaten	Kidâné nehekomena
Ye have been beaten	Kidâné nehekoua
They have been beaten	Anènè haouaké
I shall or will be beaten	Indâné heko-kâté
Thou shalt or wilt be beaten	Kidâné heko-kâté
He or she shall or will be beaten	Anè haoua-kâté
We shall or will be beaten	Kidâné hekomena-kâté
Ye shall or will be beaten	Kidâné hekoua-kâté
They shall or will be beaten	Anè haouaké-kâté

ADDITIONAL NOTES.

Page 364. *Children never suffer from dentition.*

THIS is a mistake. The Indian children seem to suffer not much less from dentition than the children of the Europo-Americans. This assertion is stated on the authority of Indians themselves, and of persons who have resided among the Indians. Some of my information, on this head, has been derived from the Miami and Putewoatamie Indians, who seem to have been better known to Mr. Volney than almost any of the other tribes.

Page 416. *They commonly call this being the* Master of life, *or* He who made us, *though this title they may have gotten from the missionaries.*

By some of the tribes, he is called the *Upholder of the skies*, and the *Maker of the soul.* The last of these appellations has, I am persuaded, been derived from the missionaries and traders; the former seems more purely Indian. The words *kitchi*, *kitschi*, *kutche*, &c. which are prefixed by many of the tribes to the word *Manito*, or *Manitou*, signify great: and it is worth observing, that *Kootcha*, or *Kutxa*, is one of the appellations for God in the language of some of the people of Kamtschatka.

Page 418. *The missionaries tell us, that they have notions of reward and punishment, but this, to deserve credit, demands more impartial testimony.*

The idea of rewards and punishments seems not less natural to the human mind than the notion of a future state. There is, I think, little cause to doubt, that the American Indians, independently of any intercourse with the missionaries or traders, had embraced both of these opinions, which seem to form a fundamental part of the religious system of the savages, in every part of North America.

Page 419. *Shamanism, or the system of Buddtha, may possibly have spread itself throughout the old world, where it is found even at the extremities of Spain, Scotland, and Denmark; but it is quite as possible that it is a native product of the human mind, since it every where bears an intimate relation to the habits and condition of the people who profess it.*

The mythological system of the Americans is, in very many respects, so similar to that of certain Asiatic nations, that the most natural inference is, that the one is derived from the other. A system so similar, not only in its general complexion, but also in many of its individual features, could never have been "a native product of the human mind," in opposite portions of the earth, where all interchange of manners, of religions, and of customs, was precluded. The only just theory of the physical, moral, and religious condition of mankind is founded upon this solid truth, that all nations are derived from a common stock, and that the dispersion of nations did not take place until after the seeds of those religious truths and prejudices, which are every where to be met with, had been implanted in their minds.

Page 421. *Every body assured me, that they had no clear tradition of a fact which happened a hundred years ago.*

Nothing can be more unfounded than this assertion. It is not contended that the stream of tradition can ever be preserved pure for a very considerable time; but when it is remembered, that Indian men and women sometimes live to the age of eighty, ninety, and a hundred years, and, even at this very advanced age, preserve the faculties of their minds as little impaired as those of the aged whites, it would indeed be a very remarkable circumstance, if there did exist among the Indians "no clear tradition of a fact which happened a hundred years ago." But Mr. Volney's assertion might be controverted by an appeal to many of the missionaries and other persons, who have resided among the Indians. Some of the missionaries, in particular, have related to me facts impressively calculated to show how correctly the Indians often preserve the memory of events, that had taken place at a period much beyond the period of one hundred years. Not to insist any further upon this subject, it is a truth, that the Delawares, Monsees, and other tribes, still preserve a lively remembrance of the first arrival of the Europeans at New York, almost *two* hundred years ago.

Page 422. *All these mounds have been formed by the same means, and require no tools but hoes and baskets.*

For some very interesting information concerning the western fortifications, as they are commonly called, the reader is referred to a paper, by the learned bishop Madison, in the Transactions of the American Philosophical Society, vol. VI, part 1, Philadelphia, 1804.

Page 423. *Language is the most instructive and unerring of all the monuments of rude nations. Dr. Barton has published a curious dissertation on this subject, in which he compares several of their dialects with each other, and with those of the Tartarian nations of Asia. He was aided in this task by the collections, made by Dr. Pallas, of words in near three hundred Asiatic languages, by order of the empress Catherine.*

The comparisons have been extended to *all* the Tartar tribes enumerated in the great work of the Russian professor, which contains two hundred and one languages of *Europe and Asia*, and not near three hundred *Asiatic* languages, as Mr. Volney says. My comparisons have been extended to many other Asiatic, as well as European, tribes besides the Tartars: to the Semoyads, the Chinese, the Japanese, the nations inhabiting the mountains of Caucasus and Oural, &c. Indeed, some of the most interesting instances of affinities are to be found between the languages of the last-mentioned nations and those of the Americans. The affinities leave no room to doubt, that the greater part of the known North American nations are branches of the same great stock, from whence have proceeded the Tartars, Samoyads, Chinese, Japanese, Kartalini, Vouguls, and many other nations of Asia and Europe. And if this point be established, I presume the philosophy of the Little Turtle (see page 363) will avail but little in diminishing our confidence in the generally received opinion, that the Americans are the descendants of the Asiatics, and not the latter of the former.

The affinities between the dialects of the Caribbees, Brazillians, and Peruvians, on the one hand, and those of the Putewoatamies, Delawares, and Six Nations, on the other, are, it is readily confessed, not very numerous: but they are sufficiently numerous to establish this point, that these languages (some of them at least) are not so radically distinct as has been imagined. With respect to the dialects of the Six Nations, I still maintain, that they are

not radically distinct from the dialects spoken by the tribes of the Lenni-Lennape, or Delaware stock, viz. the Chippeways, the Miamis, the Sawannoos, the Putewoatamies, and many others. Later and more extended enquiries have confirmed me in the opinion I formerly advanced on this subject (see *New Views*, &c. appendix, p. 17—19). There is a still greater resemblance between the dialects of the Six Nations and those of the southern tribes, known by the names of Cherokee, Muskohge (or Creeks), Chickasaws, Chactaws, &c. All these speak dialects of a language unquestionably one and the same. Our knowledge of the languages of South America is very limited; but it is sufficient to show us, that the Peruvians, Chilese, Brazillians, and other nations of the southern hemisphere, do not speak languages radically distinct from those of certain tribes and nations in the northern hemisphere; and that the South Americans, as well as the North Americans, still preserve considerable fragments (as well as the peculiar genius) of the language of Asia. But this subject will be treated at considerable length in the second part of my *New Views*, which is nearly ready for the press.

Page 434. *In general, all words implying beautiful and good begin with a p, and, on the contrary, those that signify bad or ugly with an m.*

In looking over Mr. Volney's vocabulary, we shall find, that there is but very little solid foundation for the preceding observations. It is true that some words beginning with an *m* do signify things, &c. not very agreeable to us, such as *matchi*, wicked, *moteïousina*, ugly, &c. On the other hand, however, the Miami names of Indian corn (which is certainly a very agreeable article to the savages), a woman, the forehead, an island, a rivulet, a tree, a bow, a path, a boat, a beaver, a bear, the savages themselves (*Metoxthʿniaké*), not to mention others, all begin with the letter *m*.

As to the letter *h*, it appears from Mr. Volney's own vocabulary, that the words for night, rain, winter (which cannot have many charms to a cold or naked savage), and others, begin with the letter *h*. If this were the proper place to pursue this subject, it would be easy to show, that Mr. Volney's two observations have as little foundation in the languages of those other North American tribes (the Chippeways, the Putewoatamies, &c.), which are most nearly allied to the dialect of the Miamis.

FINIS.

Bear I.
Shagatskoe
ASIA
Kilnischik
C. Nerik
Sea of Anadir
Clerkes I.
Norton Sound
Gores I.
Cape Pr. of Wales
Denbigh
P. Shallow Water
Shoal Ness
Calm P.
Newnham
BRISTOL BAY
COOKS INLET
Kruke Fyrth
ICELAND
Thiodongers Fyrth
Herfolts Nes
Emors
Dyrnas
Whale I.
C. Discord
C. Farewell
C. Desolation
Nain
EAST or OLD GREENLAND
NEW GREENLAND
S.E. Bay
Wide B.
Mosquito Cove
60
50

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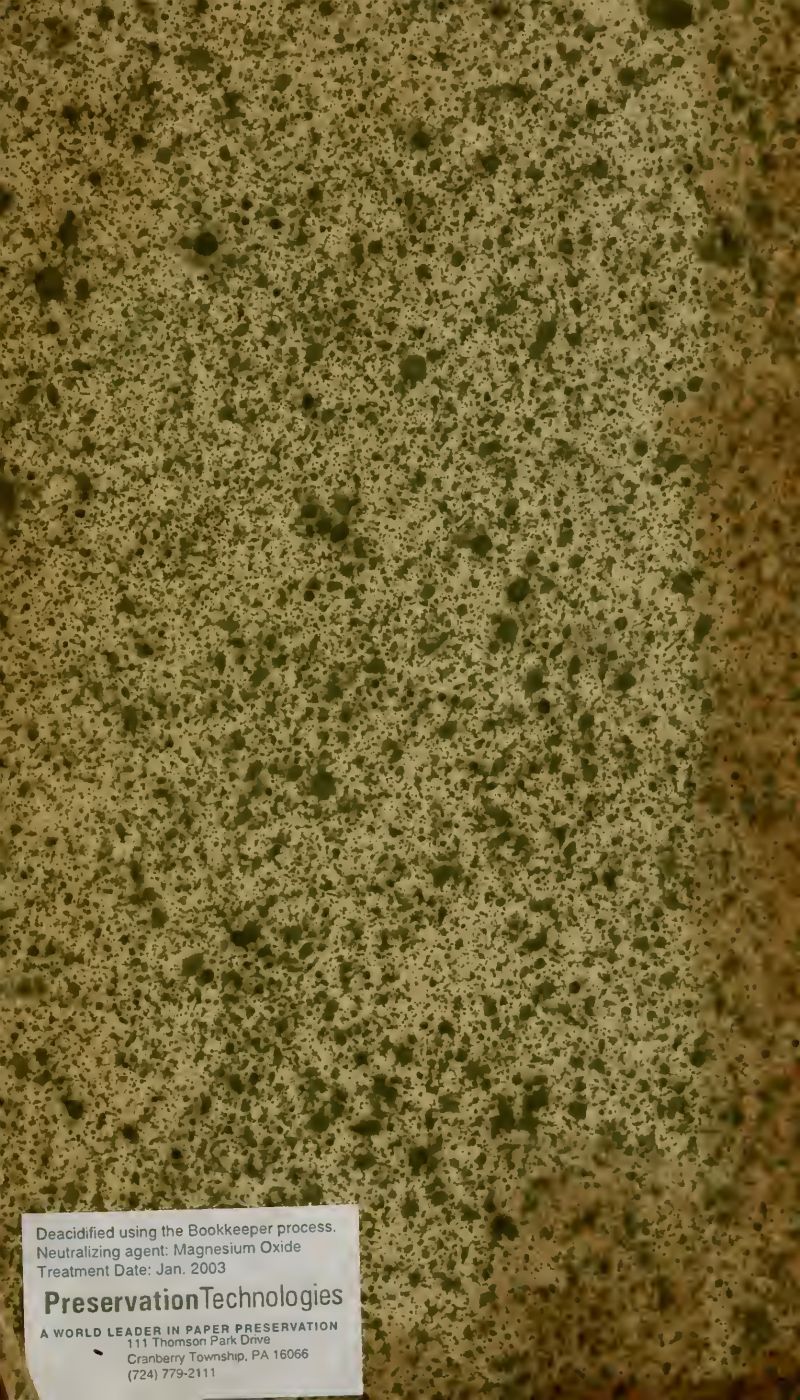
FINIS.

NORTH AMERICA
SOUTH AMERICA
ASIA
ARCTIC CIRCLE
TROPIC OF CANCER
EQUINOCTIAL LINE
GREENLAND
EAST or OLD GREENLAND
LABRADOR
HUDSON SEA
NEW SOUTH WALES
CANADA
LOUISIANA
Missouri R.
Snake Nation
S.t Fe
TEXAS
New Orleans
GULF of MEXICO
ISLE OF CUBA
Cooks Inlet
Bristol Bay
Norton Sound
Shagatskoi Prom.
Q. Charlottes I.
C. Blanco
C. Mendocino
P.t S. Fra. Drake
Cabo de S. Lucas
Corrientes C.
Zacatula
Acapulco
Port Remedios
Porto Bello
Maracaybo L.
Bay of Buenaventura
G. of Guayaquil
C. Blanco
Truxillo
Lima
Lake Superior
Philadelphia
Delaware Bay
Chesapeake
Boston
Charleston Bar
Bermudas
Newfoundland
S.t Johns
Longitude West from Greenwich

Hooker sc.

ATES
NEW BRUNSWICK
MAINE
Quebec
Tanner Sc.
R. St. Lawrence
L. St. Peter
R. St. Francis
Montreal
Schedic
Passamaquaddi Bay
Machias
Penobscot
Umbagog Lake
Vassalboro
Crown
Ticonderoga
Black R.
Kingston
Bennington
Charleston
Litchfield
Newburyport
Salem
BOSTON
Hartford
Springfield
Hartford
Chatham
Nantucket I.
Martha's Vineyard
Hamstead
Albany
Brunswick
Trenton
Burlington
Woodbury
Salem
Red Lake
Mississippi R.
Black R.
Lake of the Woods
70
65
45
40

UNITED STATES
Drawn by S. Lewis
Tanner Sc.
Quebec
Lake of the Woods
Rainy L.
The Grand Portage
LAKE SUPERIOR
Red Lake
Bear Lake
Mississippi R.
Gosse R.
Falls of St. Antony
Fort Snelling
Lake Huron
Lake Michigan
Lake Ontario
Lake Erie
Lake Erie
Detroit
Montreal
Quebec
Portland
Boston
Philadelphia
Baltimore
Washington
Richmond
Norfolk
Raleigh
Charleston
Savannah
Nashville
Vincennes
Chillicothe
Frankfort
Cumberland
Knoxville
Nashville
Cumberland R.
Ohio R.
Missouri R.
New Madrid
Mississippi R.
Muskogee
Seminoles
Pensacola
Mobile
Natchez
Gulf of Mexico
Atlantic Ocean
New Brunswick
Maine
Massachusetts
Connecticut
Rhode Island
Pennsylvania
Delaware
Maryland
Virginia
Carolina
Georgia
Florida
Canada
Louisiana
Long. W. from London
Long. W. from Philadelphia
Long. E. from Philad.



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